THERMAL ARRAYCORDER

WR300

WR300-UM-251

SERVICE MANUAL

WR300-UM-251-02-9370

GRAPHTEC

HISTORY OF REVISIONS

No.	Date issued	Description of revision	Page	Edition
1	04.09.27	First Printing	All	01
2	06.03.29	Disassembly procedure was corrected for the main board.	3-19	02
3	06.03.29	PCMCIA card slot part was added.	6-8	02
4	06.03.29	Procedure of replacing for the PCMCIA card slot part was added.	3-20, 3-21	02

TO ENSURE SAFETY

This Service Manual has been compiled for the purpose of facilitating repair and maintenance of the WR300 Series Thermal Arraycorders by Graphtec service personnel and other persons who have undergone equivalent technical training.

Maintenance or repair by unauthorized service personnel is to be strictly avoided. Because the WR300 contains numerous internal components with a high electric potential, such work by unauthorized service personnel could cause human injury or serious damage to the recorder.

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1. CONFIGURATION

1.1 Model Configuration

The model number of the WR300 Series Thermal Arraycorder varies according to the number of channels installed in the main unit, as explained below.

WR300-4 : 4-channel model
WR300-8 : 8-channel model
WR300-16 : 16-channel model
WR310-8 : 8-channel model with an HDD and the IRIG function
WR310-16 : 16-channel model with an HDD and the IRIG function

1.2 Supplies

Name	Part no.	Minimum sales unit	Remarks
Thermal paper	PR230	10 rolls	100 mm width, 40 meters/roll
Thermal paper	PZ230	10 packs	100 mm width, Z-fold paper, 40 meters/pack
Thermal paper	PR231A	10 rolls	200 mm width, 40 meters/roll
Thermal paper	PZ233	10 packs	200 mm width, Z-fold paper, 40 meters/pack
Thermal paper	PZ231A	5 packs	200 mm width, Z-fold paper, 100 meters/pack, For use with the long-length Z-fold box
Head cleaner kit	B-368	1 kit	Cleaning fluid and sheets for cleaning the thermal print head

1.3 Accessories and Options

Unit name	Model name	Description
Voltage amp	WR3-V amp	2 channels/unit
Voltage/Temperature amp	WR3-M amp	2 channels/unit
DC Strain amp	WR3-DCB amp	2 channels/unit
Frequency-to-voltage conversion amp	WR3-FV amp	2 channels/unit
200 mm width long-length Z-fold chart unit	B-522	200 mm width , 100 m Z-fold paper
100 mm width Z-fold chart unit	B-523	100 mm width , 40 m Z-fold paper
200 mm width Z-fold chart unit	B-524	200 mm width , 40 m Z-fold paper
12 VDC drive	B-525	12 VDC adapter
2-pin banana-plug cable	B-331	RIC-115 set of 8 input cables
	B-335	RIC-115 set of 16 input cables
DC power cord	RIC-140	2-m cord with 10-pin round connectors
Clamp adapter	CM-102	Measures AC 0 to 1200 A: 1 ch
Clamp adapter	CM-112	Measures AC 0 to 40/400 A: 1 ch
Digital clamp meter (1-ch)	CM-111	Measures AC/DC current (0 to 2000 A), AC/DC voltage (0 to 1000 V), resistance (0 to 4.000 kΩ), frequency (0 to 4000 Hz), and temperature (-50 to +160˚C)
Digital clamp meter (2-ch)	CM-114	Measures AC/DC current (0 to 2000 A), AC/DC voltage (0 to 1000 V), resistance (0 to 4.000 kΩ), frequency (0 to 4000 Hz), and temperature (-50 to +160˚C)
Logic IC cable	RIC-07	To connect RIC-08/09 with logic amp
Alligator-clip cable	RIC-08	For use with logic amp
IC-clip cable	RIC-09	For use with logic amp
Probe set	RIC-10	One each of RIC-07, -08, -09
Floating voltage input probe	CM-105	
Voltage fluctuation probe	CM-106	
Temperature probe for clamp meter	RIC-110	-30 to +200˚C : For use with CM-111
Line separator	CM-108	x1, x10 : For use with CM-111
Safety conversion adapter	SMA-102	An adapter for converting a high-voltage banana plug into a BNC plug

2. UPGRADING THE FIRMWARE

The version of your WR300's firmware can be upgraded by rewriting the flash ROM on the pertinent circuit boards using a choice of methods. You can upgrade the firmware by loading the update program from either a personal computer via the TCP/IP port or from a PCMCIA card.

2.1 How to Upgrade the WR300 Flash ROM from the TCP/IP port

Preparations for the upgrade

(1) Connect the AC cable for the WR300.

(2) Connect the LAN cable for the WR300 and the PC. (If you connect P to P, use a cross LAN cable. If you connect with a hub, use a parallel LAN Cable.)

How to upgrade

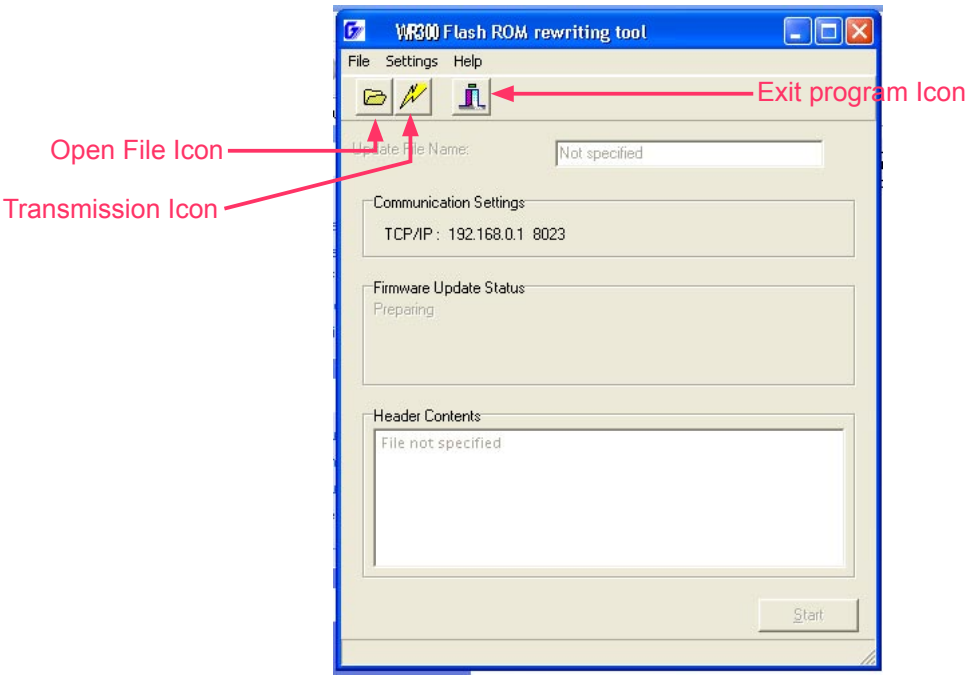
OS :Windows 2000/XP
Software :WR30upd.exe ← Upgrade software file
:xxx.dll ← Upgrade software dll file
Firmware :Mxxxa001.W30 ← Main Program file for WR300
:Sxxxa001.W30 ← Sub Program file for printer
:Ixxxa001.W30 ← Sub Program file for IRIG

(1) Copy the upgrade software files to the same directory in the PC.

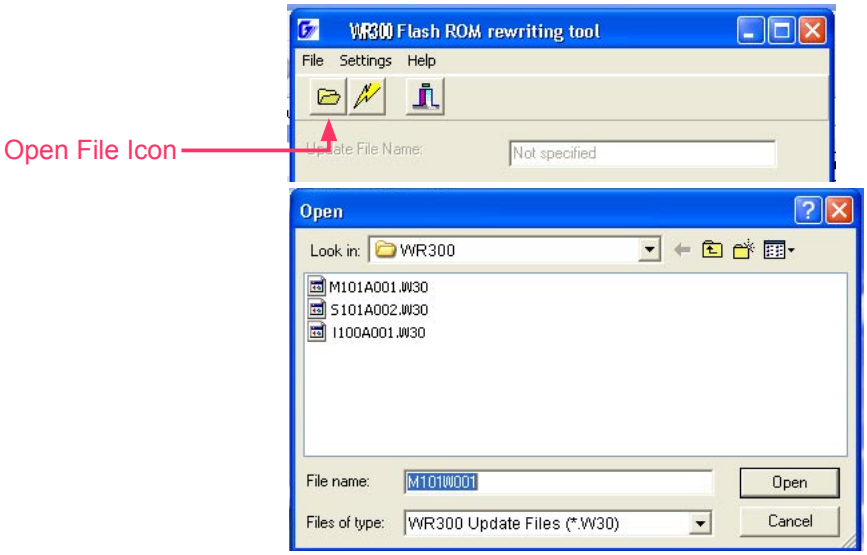
(2) Turn on the power switch of the WR300.

(3) Execute WR30upd.exe.

(4) The following menu is displayed.

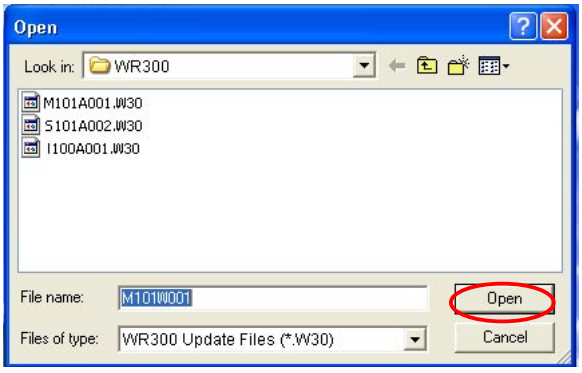


(5) Click the Open File icon to display the following menu.



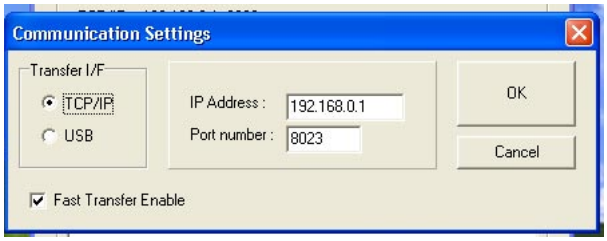
(6) Select the main update file as "Mxxxa001.W30".

(7) Click the Open Button.

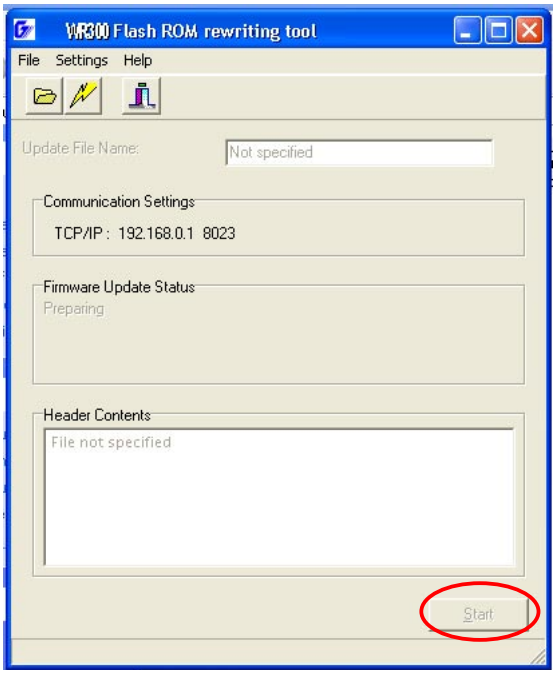


(8) If you need to change the TCP/IP settings, click the transmission icon to set up the TCP/IP conditions.

The default setting for the WR300 is set to “192.168.0.1”.
If you haven’t changed it, use this setting.
Also, your computer’s TCP/IP port setting must be set to the same segment as “192.168.0.X”.



(9) Click the Start button to start upgrading when you are ready to upgrade.

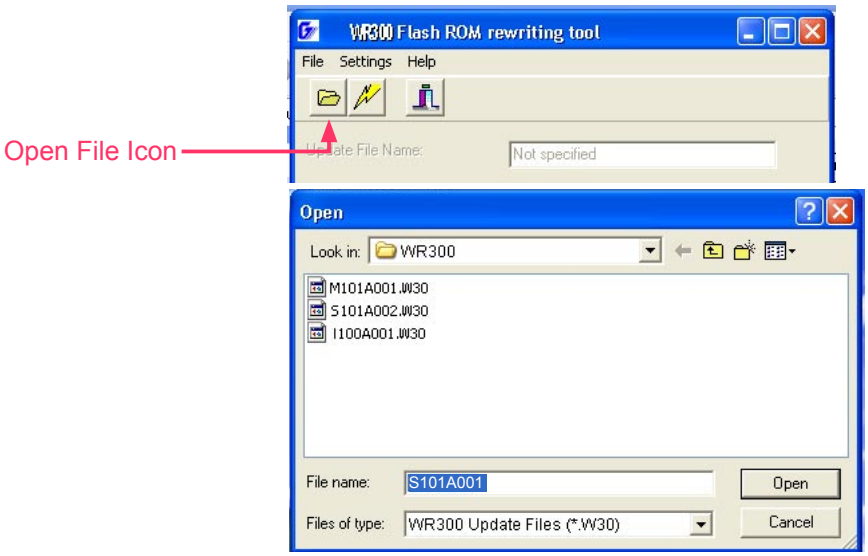


The following message will appear on the WR300 display in yellow characters when the upgrade is complete. Also the beeper will sound for 2 seconds.
“Please Turn Off the Power. I have locked up.”

(10) Turn off the power to the WR300 when the above message is displayed.

(11) Turn on the power to the WR300 again.

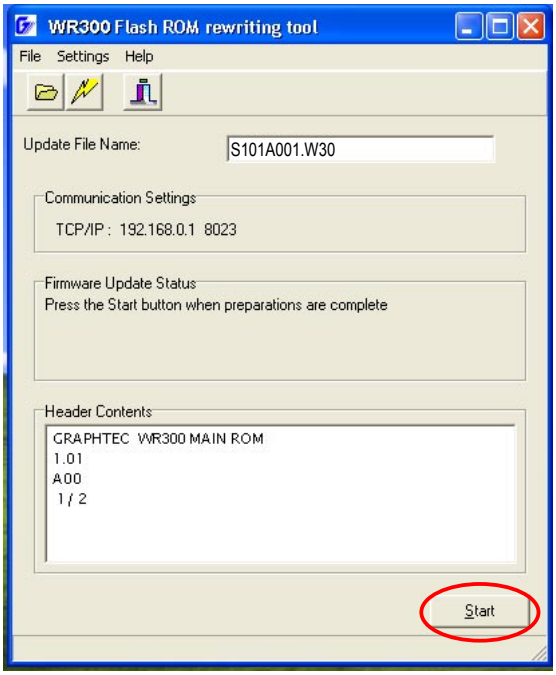
(12) Click the Open File icon to display the following menu.



(13) Select the sub update file "Sxxxa001.W30" to upgrade the printer firmware.

(14) Click the Open Button.

(15) Click the Start button to start upgrading when you are ready to upgrade.

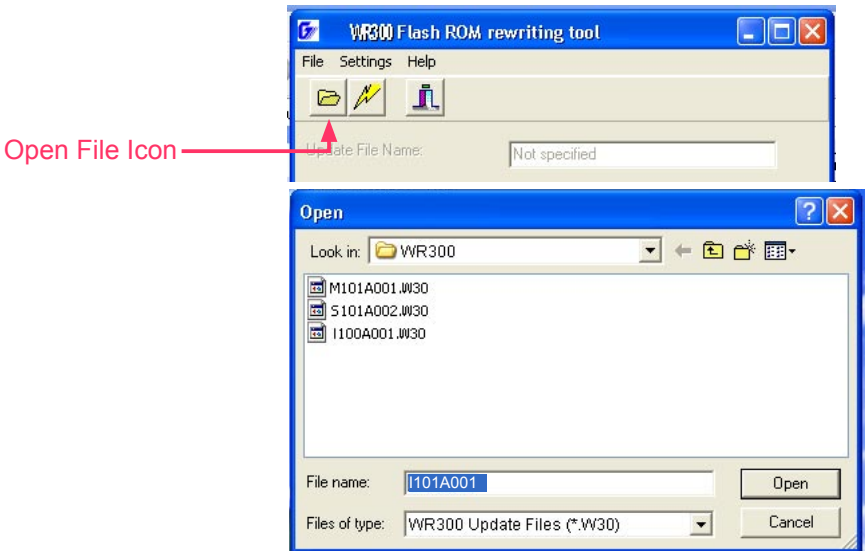


The following message will appear on the WR300 display in yellow characters when the upgrade is complete. Also the beeper will sound for 2 seconds.
“Please Turn Off the Power. I have locked up.”

(16) Turn off the power to the WR300 when the above message is displayed.

(17) Turn on the power to the WR300 again.

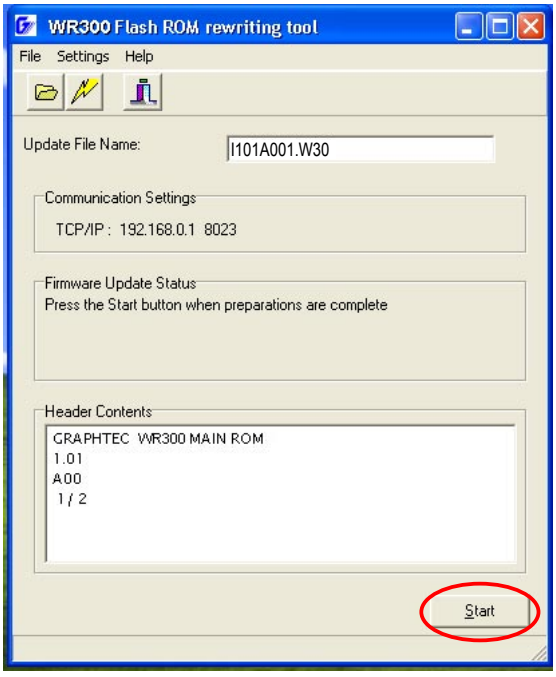
(18) Click the Open File icon to display the following menu.



(19) Select the sub update file "Ixxxa001.W30" to upgrade the IRIG firmware.

(20) Click the Open Button.

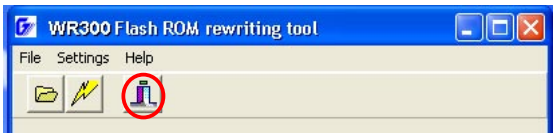
(21) Click the Start button to start upgrading when you are ready to upgrade.



The following message will appear on the WR300 display in yellow characters when the upgrade is complete. Also the beeper will sound for 2 seconds.
"Please Turn Off the Power. I have locked up."

(22) Turn off the power to the WR300 when the above message is displayed.

(23) Click the Exit icon to exit this upgrade program.



2.2 How to Upgrade the WR300 Flash ROM from the PCMCIA Card

Preparations for the upgrade

Firmware :Mxxxa001.W30 ← Main Program file for WR300
:Sxxxa001.W30 ← Sub Program file for printer
:Ixxxa001.d30 ← Sub Program file for IRIG

(1) Connect the AC cable for the WR300.

(2) Copy the main program file to the PCMCIA card from the computer. (Do not copy the sub program and other files to this PCMCIA card.)

How to upgrade

(1) Insert the PCMCIA card containing the main upgrade program into the WR300's PCMCIA card slot.

(2) Turn on the WR300 to automatically execute the upgrade program.

(3) Wait until the display shown below appears.
The following message will appear on the WR300 display in yellow characters when the upgrade is complete. Also the beeper will sound for 2 seconds.
“Please Turn Off the Power. I have locked up.”

(4) Turn off the power to the WR300 when the above message is displayed.

(5) Copy the sub program file for the printer to the PCMCIA card from the computer. (Do not copy the other files to this PCMCIA card.)

(6) Insert the PCMCIA card containing the sub upgrade program for the printer into the WR300's PCMCIA card slot.

(6) Turn on the WR300 to automatically execute the upgrade program.

(7) Wait until the display shown below appears.
The following message will appear on the WR300 display in yellow characters when the upgrade is complete. Also the beeper will sound for 2 seconds.
“Please Turn Off the Power. I have locked up.”

(8) Turn off the power to the WR300 when the above message is displayed.

(9) Copy the sub program file for the IRIG function to the PCMCIA card from the computer. (Do not copy the other files to this PCMCIA card.)

(10) Insert the PCMCIA card containing the sub upgrade program for the IRIG function into the WR300's PCMCIA card slot.

(11) Turn on the WR300 to automatically execute the upgrade program.

(12) Wait until the display shown below appears.
The following message will appear on the WR300 display in yellow characters when the upgrade is complete. Also the beeper will sound for 2 seconds.
“Please Turn Off the Power. I have locked up.”

(13) Turn off the power to the WR300 when the above message is displayed.

3. DISASSEMBLY AND REASSEMBLY

3.1 Notes on Disassembly and Reassembly

- During disassembly, disconnect the cables from the specified connectors as necessary.
- During reassembly, double-check to ensure that the proper cables have been correctly re-connected to the pertinent connectors.
- Some areas of the control panel unit possess a high electrical potential, so exercise caution to avoid an electrical shock.
- When handling the LCD shield and LCD protective plate, be careful not to leave fingerprints or other marks on them.

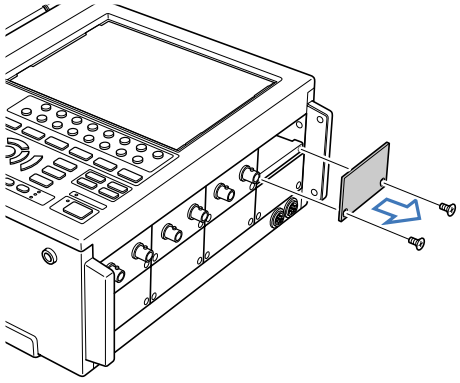
3.2 Installing or Removing an Amp

This section explains the procedures for installing or removing an analog amp. To remove an amp, perform the installation procedure in reverse. Moreover, when pulling out an amp, be sure to grasp the amp panel to pull the amp out and off.

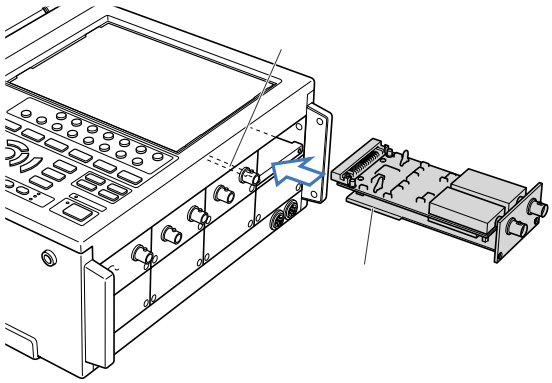
CAUTION

- Always turn off the recorder before installing or removing an amp.
- Whenever handling an amp, pay due attention to avoid static electricity and so on.

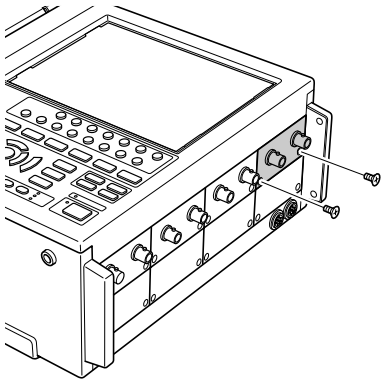
(1) Remove the amplifier slot cover retaining screws and remove the amplifier slot cover.



(2) Select an amp suitable for the type of measurements to be performed and insert it in the slot by aligning the amp's guide with the main unit guide.



(3) Secure the amp in place by tightening the setscrews.



3.3 Replacing the Bottom Cover Assembly

Disassembly

(1) Remove the six M3L6 flat head screws holding the bottom cover assembly, then remove the bottom cover assembly.

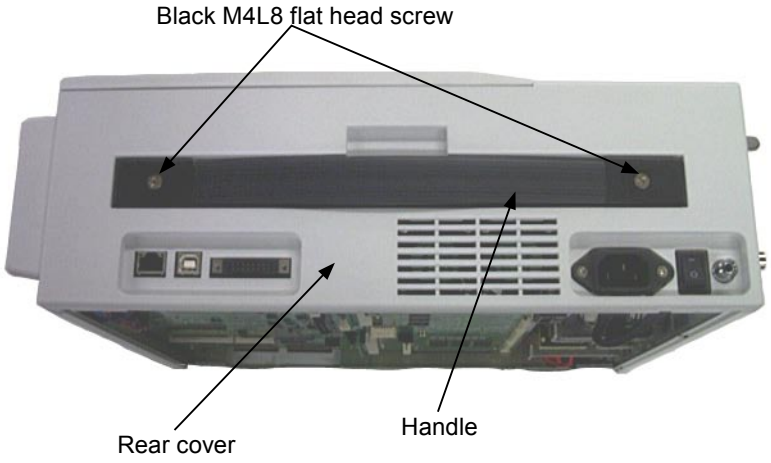
Re-assembly

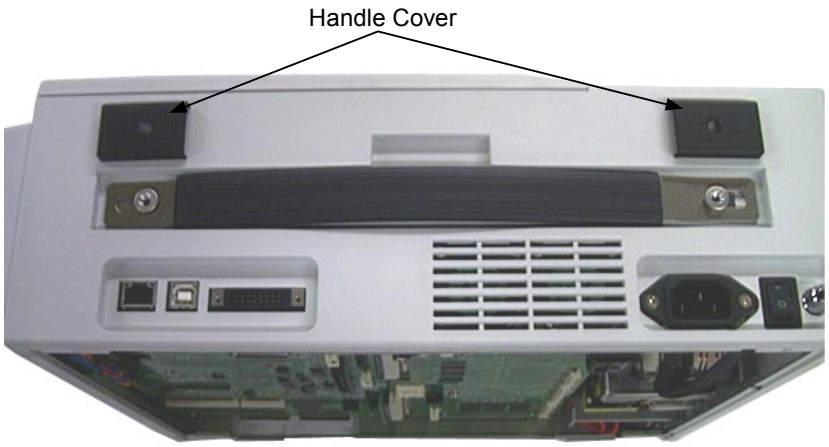
(1) To attach the bottom cover assembly, perform the above "Disassembly" procedure in reverse.

3.4 Replacing the Rear Cover

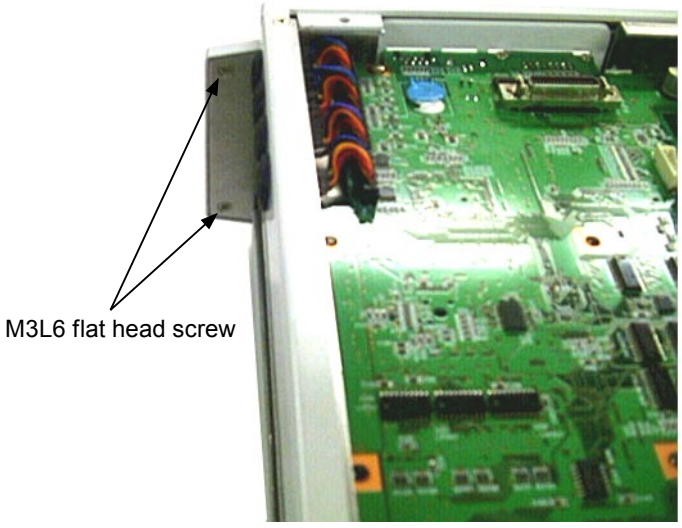
Disassembly

(1) Remove the two black M4L8 flat head screws holding the handle covers, then remove the handle covers and the handle.





(2) Remove the two M3L6 flat head screws holding the rear cover, then remove the rear cover.



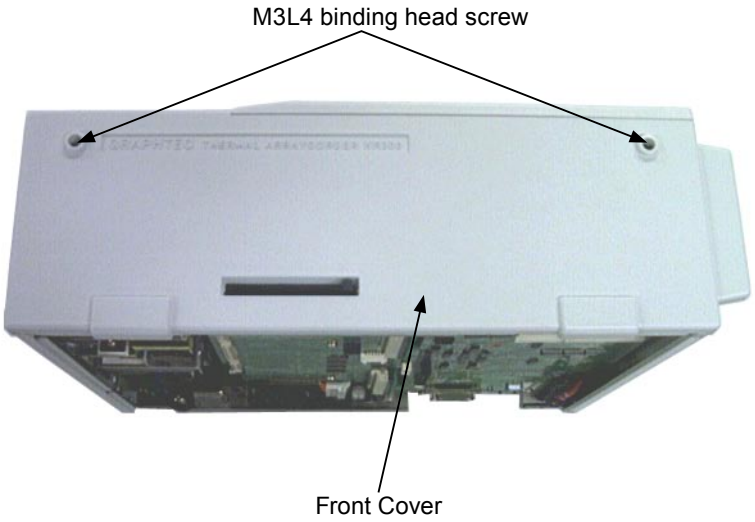
Re-assembly

(1) To attach the rear cover, perform the above "Disassembly" procedure in reverse.

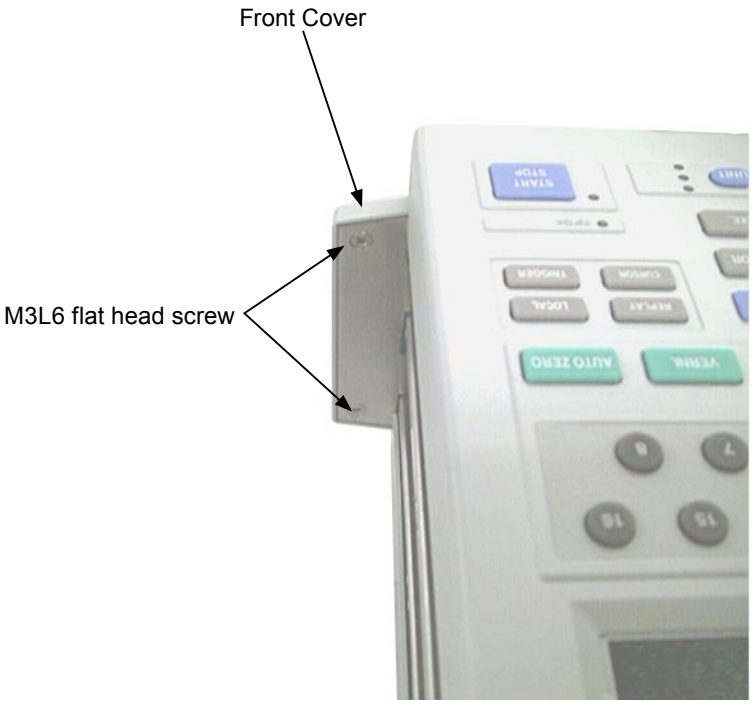
3.5 Replacing the Front Cover

Disassembly

(1) Remove the two M3L4 binding head screws holding the front cover.



(2) Remove the two M3L6 flat head screws holding the front cover, then remove the front cover.



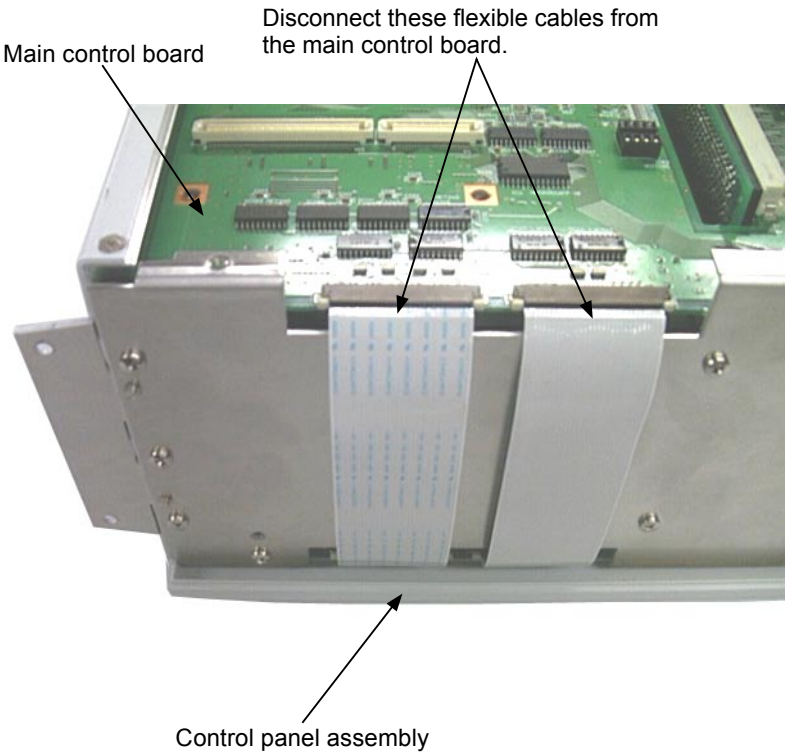
Re-assembly

(1) To attach the front cover, perform the above "Disassembly" procedure in reverse.

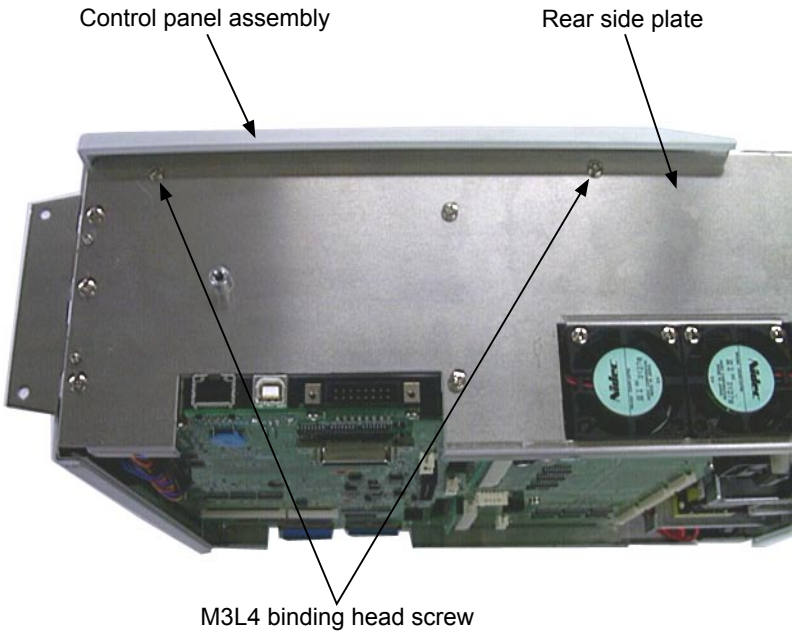
3.6 Replacing the Control Panel Assembly

Disassembly

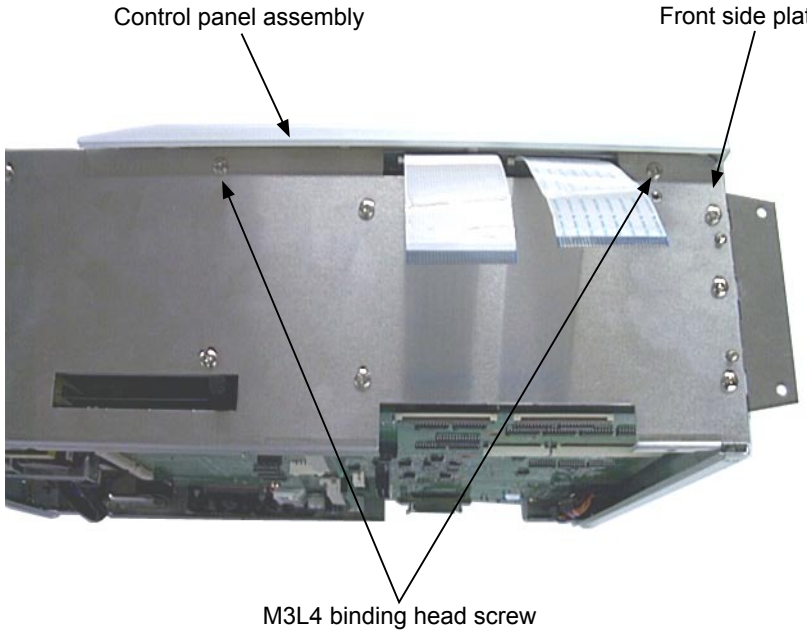
(1) Detach the bottom cover assembly (see Section 3.3).
(2) Detach the rear cover (see Section 3.4).
(3) Detach the front cover (see Section 3.5).
(4) Disconnect the flexible cables from the main control board.



(5) Remove the two M3L4 binding head screws holding the control panel assembly from the rear side plate.



(6) Remove the two M3L4 binding head screws holding the control panel assembly from the front side plate.



(7) Detach the control panel assembly from the main unit.

Re-assembly

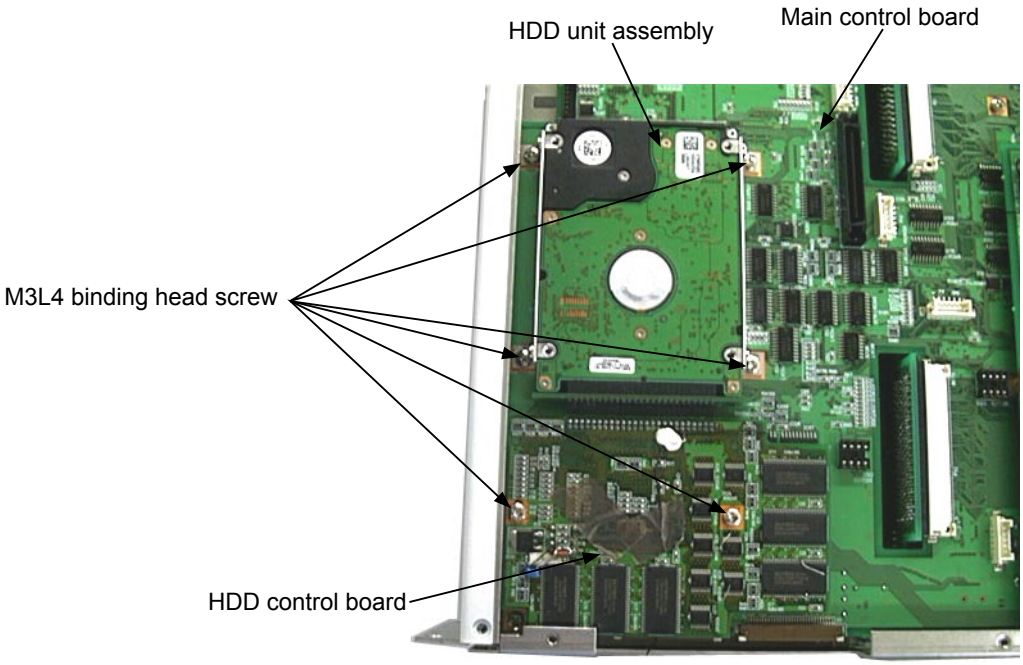
(1) To attach the control panel assembly, perform the above "Disassembly" procedure in reverse.

3.7 Replacing the HDD Unit Assembly (WR310)

Disassembly

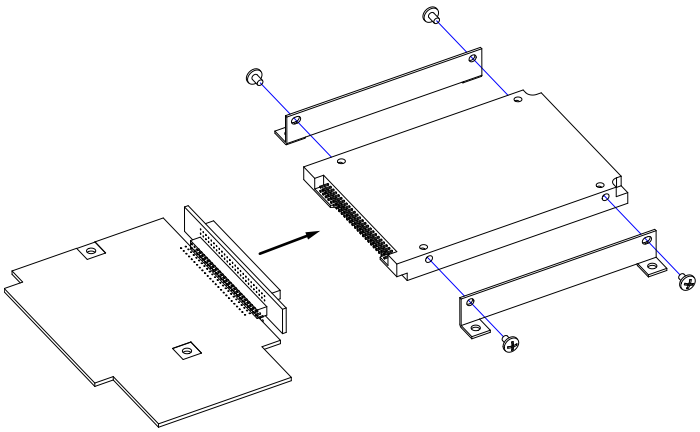
(1) Detach the bottom cover assembly (see Section 3.3).

(2) Remove the six M3L4 binding head screws holding the hard disk drive unit and the hard disk drive control board.



(3) Detach the HDD unit assembly and the HDD control board.

(4) Remove the HDD unit from the HDD connecting plate on the HDD control board.

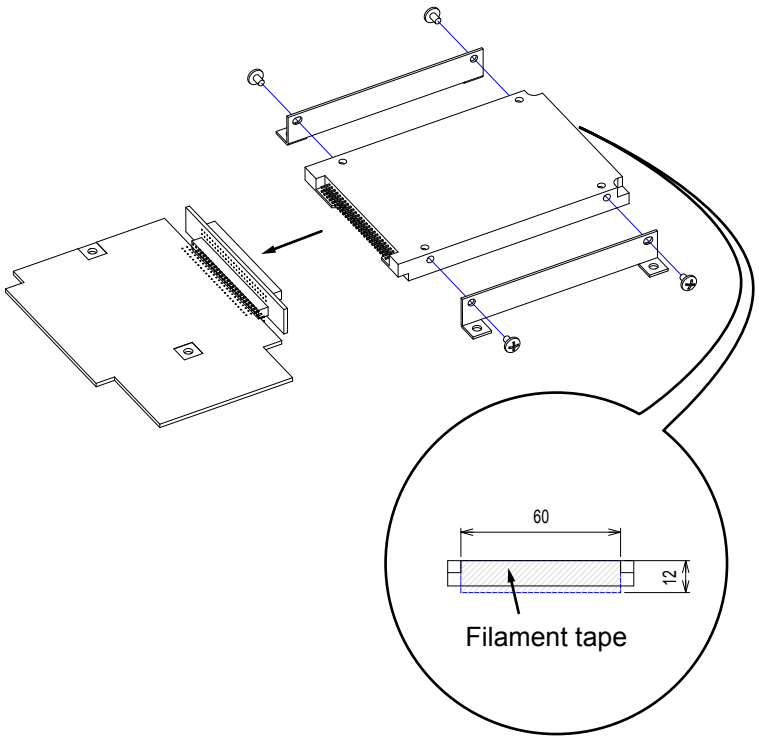


(5) Remove the four binding head screws holding the HDD mounting brackets, then remove the HDD mounting brackets at both ends of the HDD unit.

Re-assembly

(1) To attach the HDD unit assembly, perform the above "Disassembly" procedure in reverse.

(2) Apply the filament tape on the rear side of the new HDD unit.

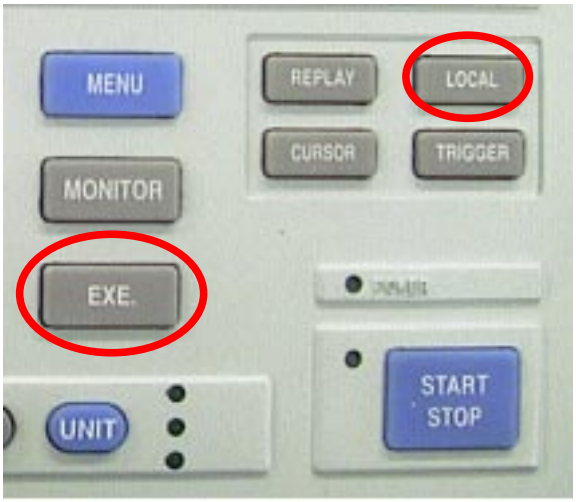


(3) Initialize the HDD using the procedure described below.

Initializing and Checking the HDD

A newly-installed HDD is not formatted.

(1) While holding down the LOCAL and EXE. keys, turn on the power. The HDD format message appears on the display.



(2) The following message is displayed.

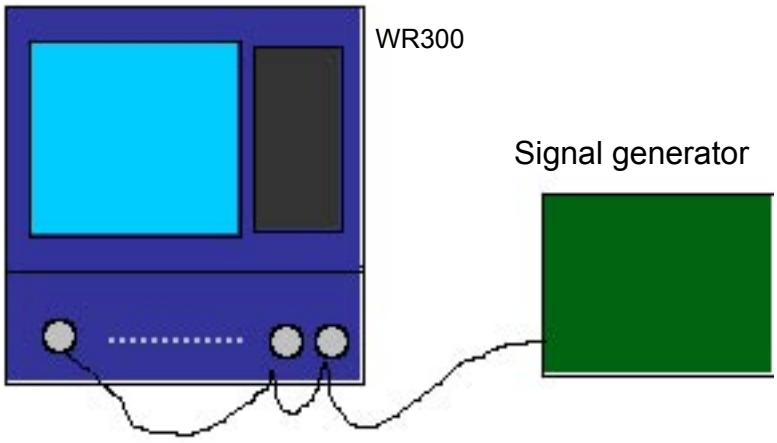
Initializing Disk System.
Detected HDD Initialize Key.
Press START Key To Start HDD Init
ialize.
Press CANCEL Key TO Cancel Operat

(3) Press the START/STOP key.

(4) Formatting of the HDD is started, and the initializing message appears for 2 to 3 seconds.

(5) After formatting is completed, the display returns to the initial menu.

Preparations for the check operation



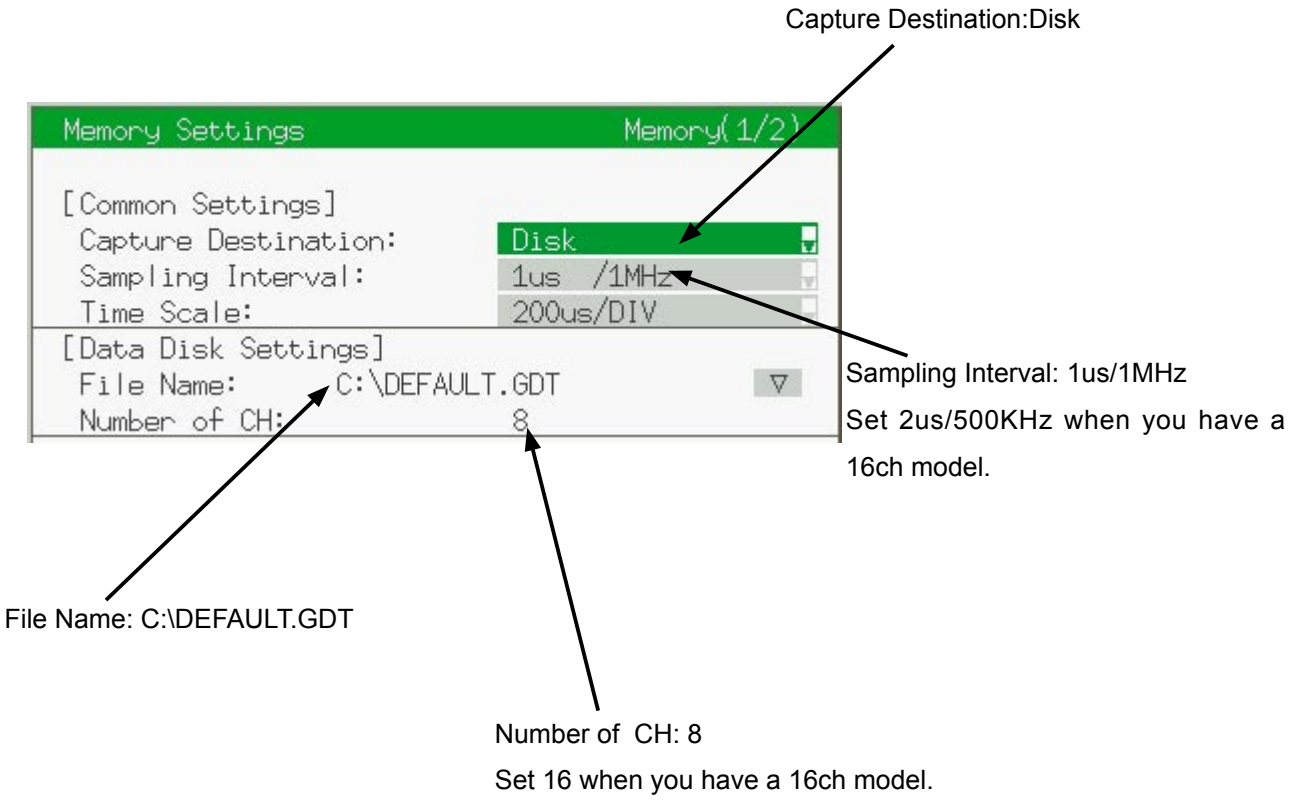
Connect the signal generator to the amplifier.

Checking method

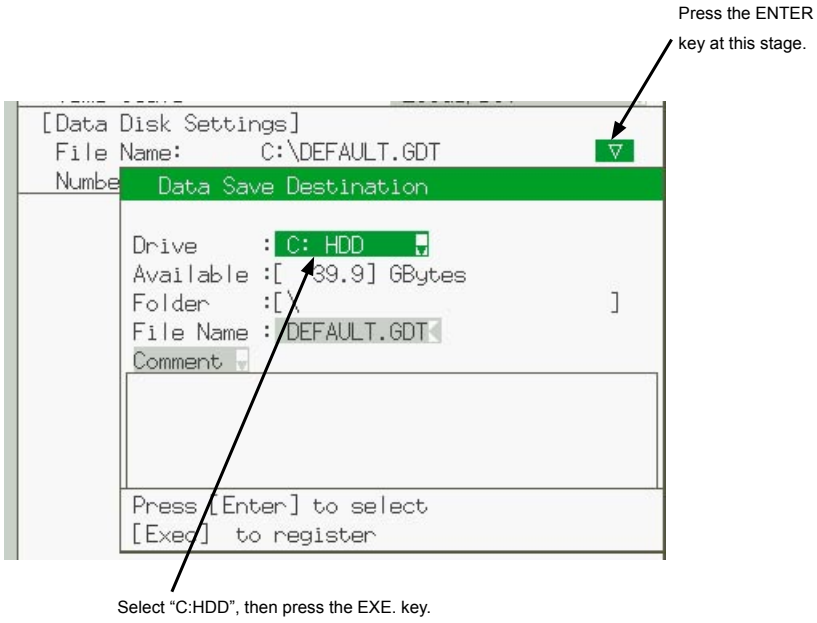
(1) Press the MEMORY key to display the menu shown below.

(2) Set each setting condition as follows.

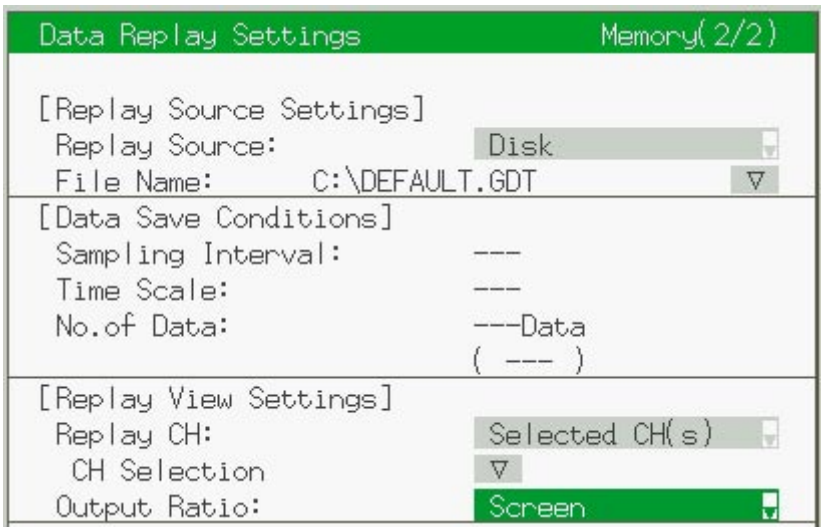
Capture Destination : Disk
Sampling interval : 1 micro second/1MHz (in the case of a 16ch model, 2 micro seconds/500kHz)
File Name : C:\DEFAULT.GDT
Number of CH : 8 (in the case of a 16ch model: 16)



(3) If the capture destination is not set to the C drive, change it at the following menu.



(4) Press the MEMORY key, and then make the data replay settings as shown below.



(5) Press the INPUT key, then set the following.

Type of Amp.	Input	Range	Filter	Span
V	DC	5V	50Hz	+2.5V to -2.5V
M	DC	5V	50Hz	+2.5V to -2.5V
DCB	DC	20mV	100Hz	+10mV to -10mV

In the case of a DCB amplifier, the input voltage is different than for other types of amplifiers. Therefore you need to check each DCB amplifier individually.

(6) Press the RECORD key, then set the trigger settings as shown below.

Common settings

Function :Memory

Time Gate :Disable

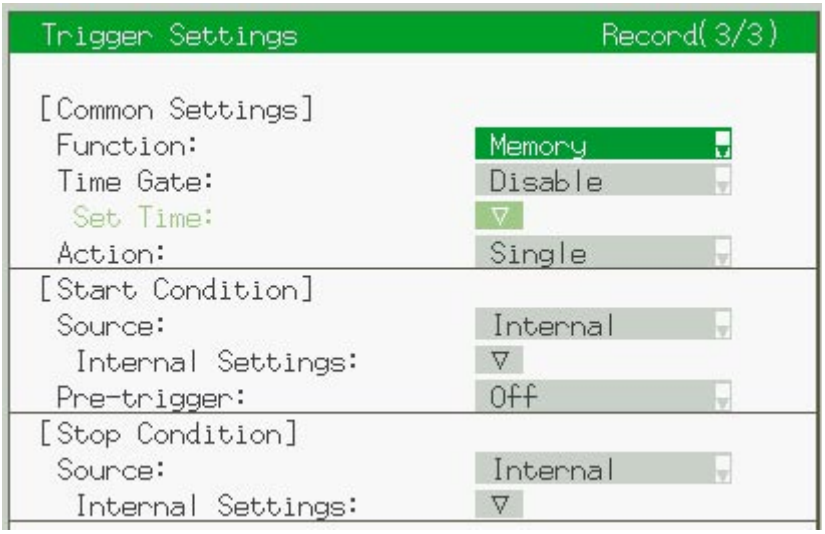
Start Condition

Source :Internal

Pre-trigger :Off

Stop Condition

Source :Internal



(7) Make the Start Condition settings as shown below.

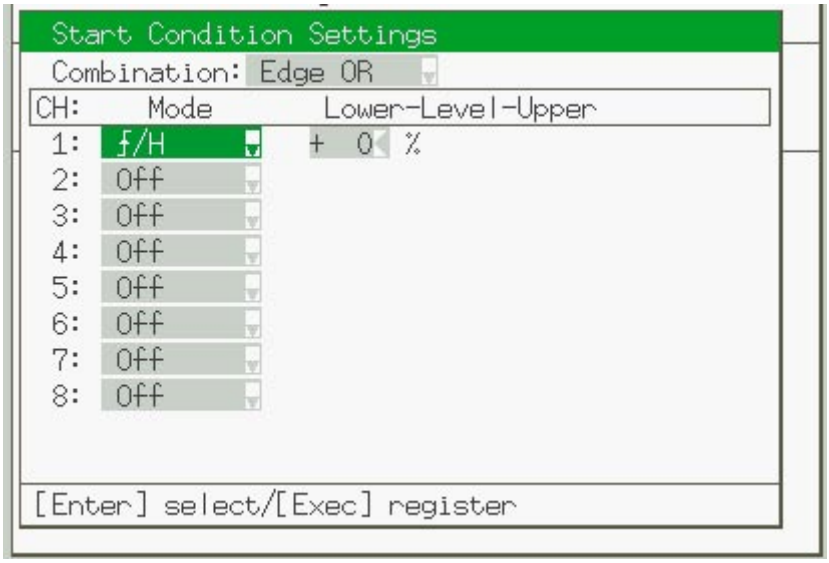
Start Condition settings

Combination :Edge OR

CH :

Level :+0%

Mode :Up H



This setting condition is required only for the amplifiers for which the input is set to “DC”.

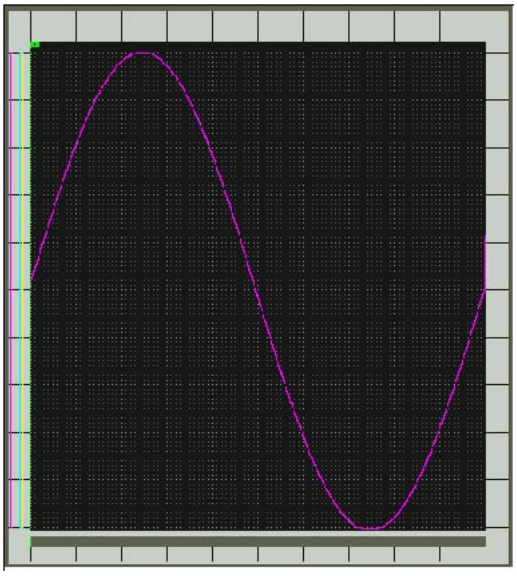
(8) Set the output of the signal generator as shown below.

Type of Amp.	Generator		
	AMPTD	FREQ	FUNC
V	5V P-P	10 Hz	Sine wave
M	5V P-P		
DCB	20mV P-P		

(9) Press the START/STOP key to start measurement.
Wait until the data capture is finished.

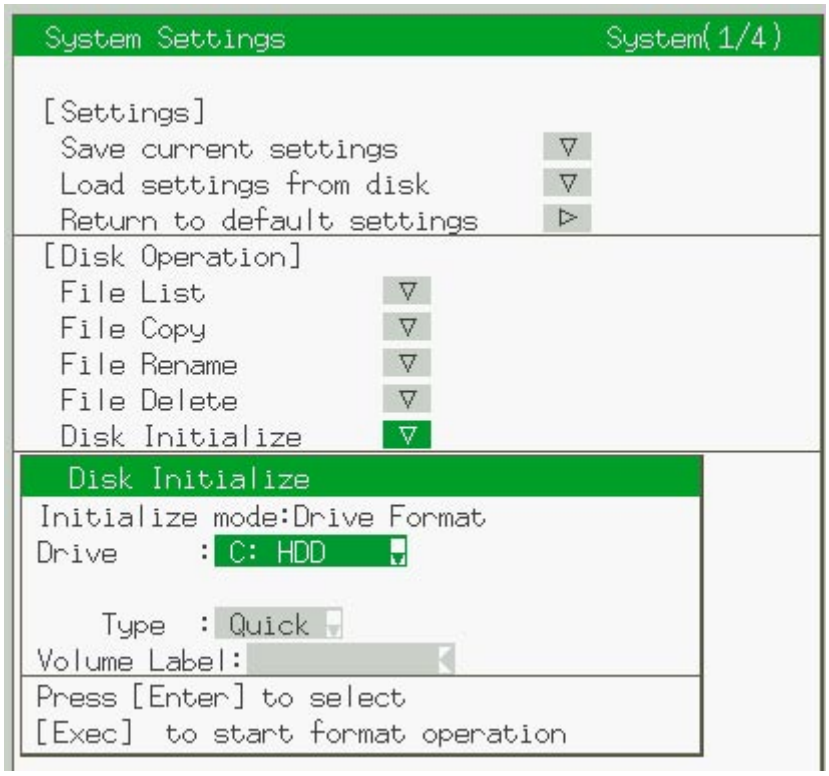
(10) Press the START/STOP key to stop measurement.

(11) Press the REPLAY key to output the waveform.
Confirm that the waveform shown below appears.



(12) Check the waveform channel by channel using the procedure described in step (10).
(13) Press the MEMORY key twice to change the Replay View Settings in the Data Replay setting menu.

(14) Press the ENTER key at the channel setting to display the channel setting menu.
(15) Turn on only the channels which need to be checked.
(16) Press the EXE. key to confirm.
(17) Press the REPLAY key to display the waveform, then check it.
(18) Repeat the above steps (10) to (16) for all channels for which amplifiers are mounted.
(19) When the HDD check has been completed, delete the data which is stored on the HDD using the following procedure.
(20) Press the SYSTEM key to display the System Settings menu, then select Disk Initialize. Press the ENTER key to display the following window.

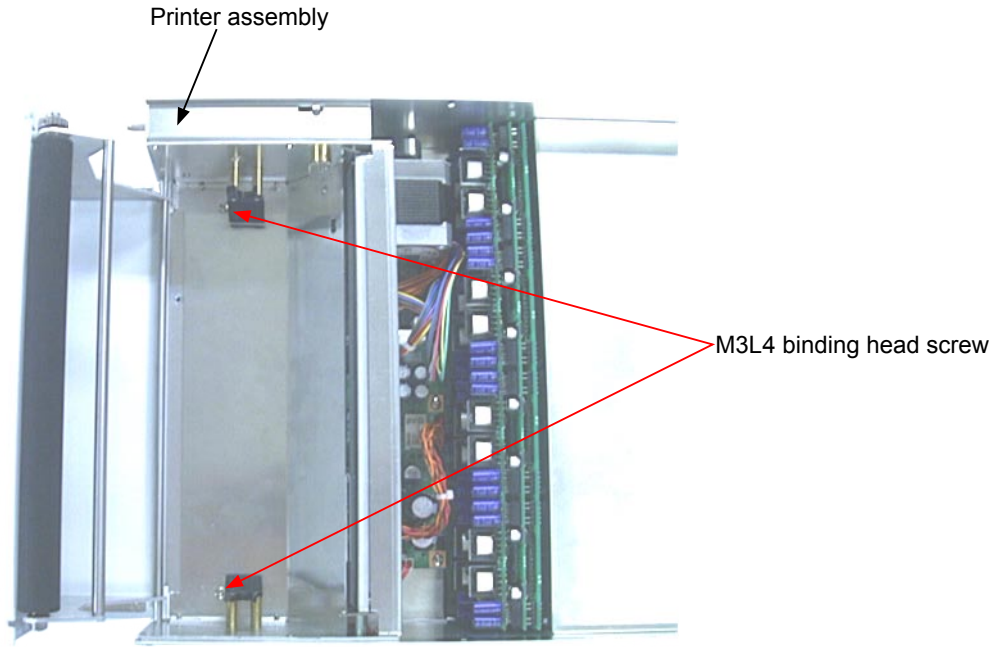


(21) Set the drive to “C:HDD”.
(22) Set the type to “Quick”.
(23) Press the EXE. key to start the formatting operation.

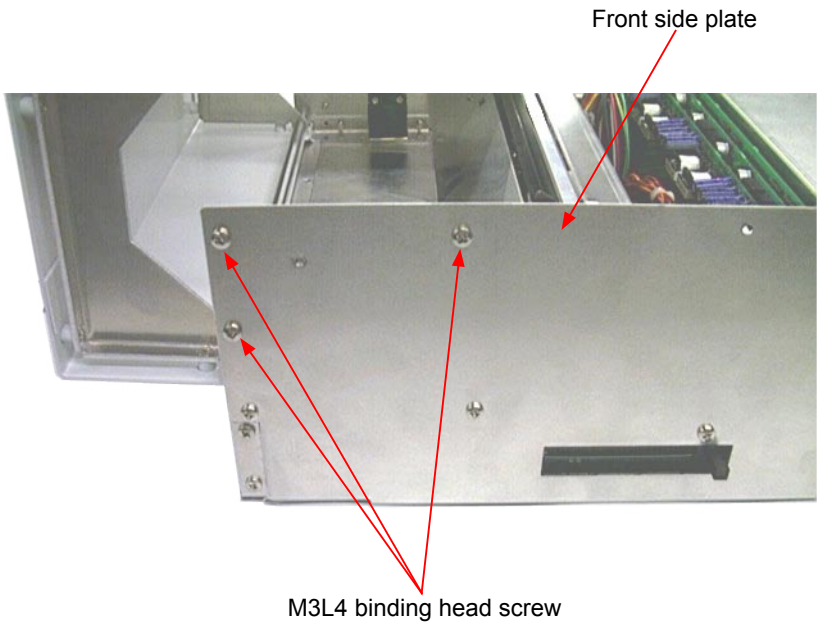
3.8 Replacing the Printer Assembly (200-mm width printer)

Disassembly

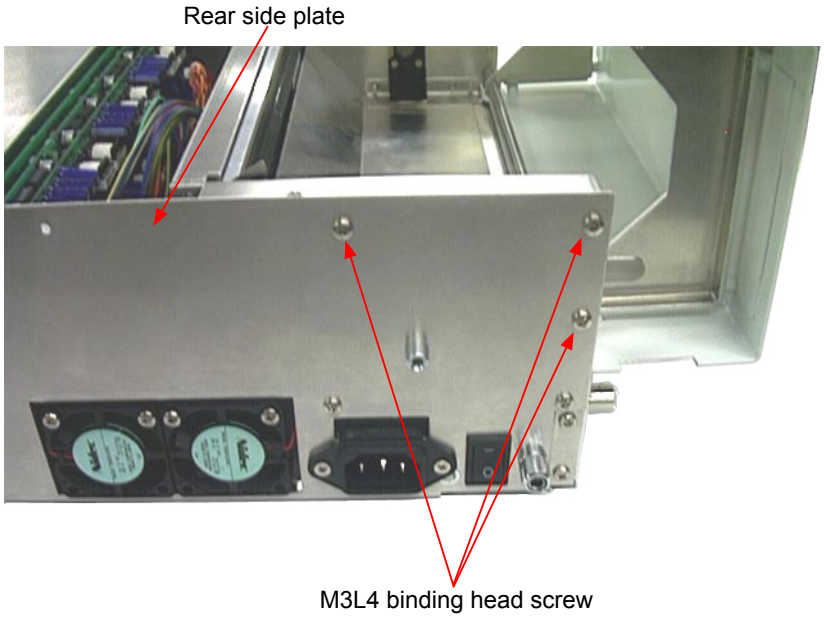
(1) Detach the bottom cover assembly (see Section 3.3).
(2) Detach the rear cover (see Section 3.4).
(3) Detach the front cover (see Section 3.5).
(4) Detach the control panel assembly (see Section 3.6).
(5) Remove the two M3L4 binding head screws holding the printer assembly from the top.



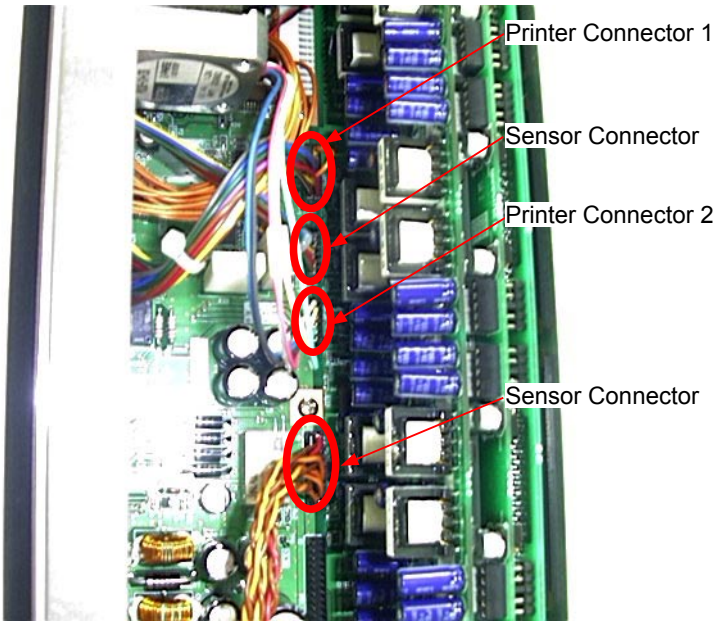
(6) Remove the three M3L4 binding head screws holding the printer assembly from the front side plate.

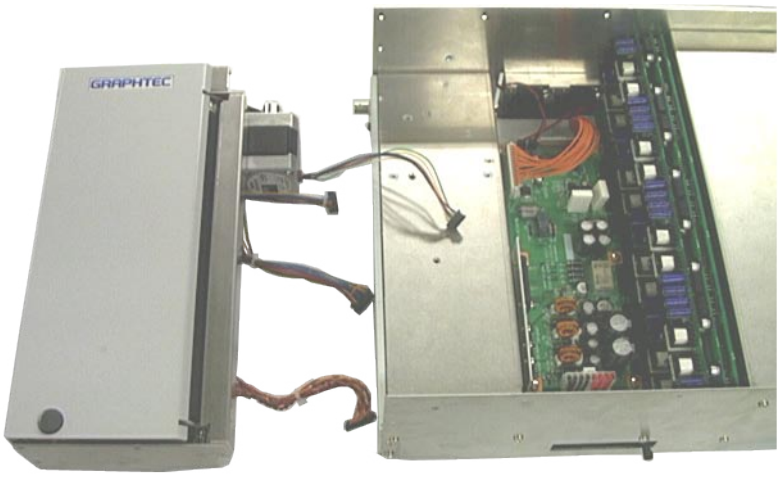


(7) Remove the three M3L4 binding head screws holding the printer assembly from the rear side plate.



(8) Disconnect all the cables from the system power board, then detach the printer assembly.





Re-assembly

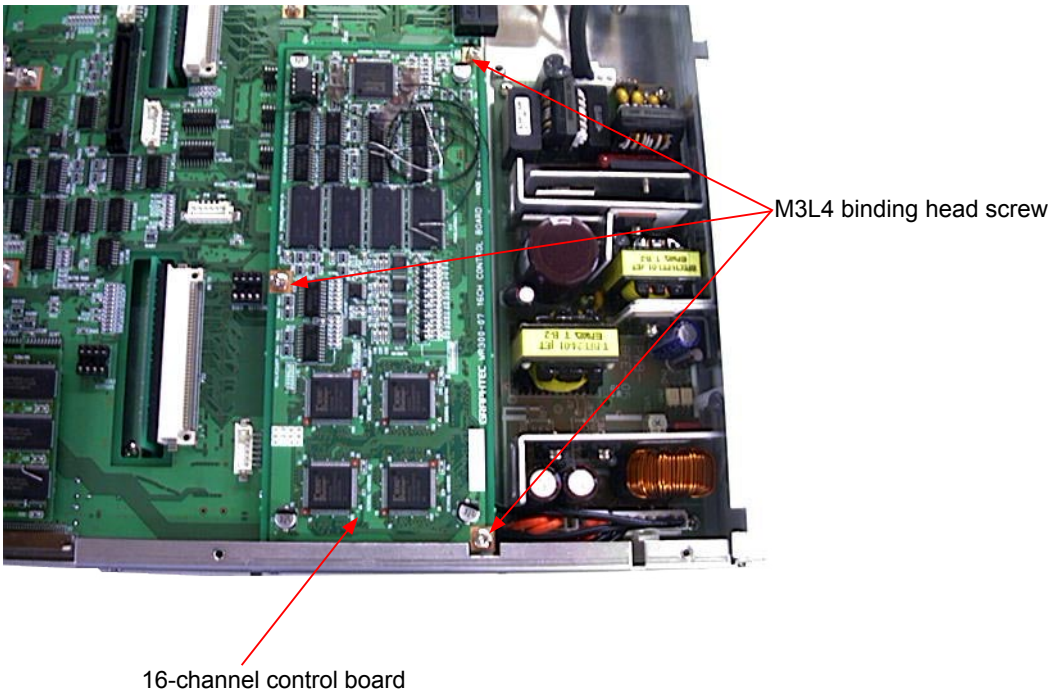
(1) To attach the printer assembly, perform the above "Disassembly" procedure in reverse.

3.9 Replacing the 16-channel Control Board

Disassembly

(1) Detach the bottom cover assembly (see Section 3.3).

(2) Remove the three M3L4 binding head screws holding the 16-channel control board, and then detach the 16-channel control board.



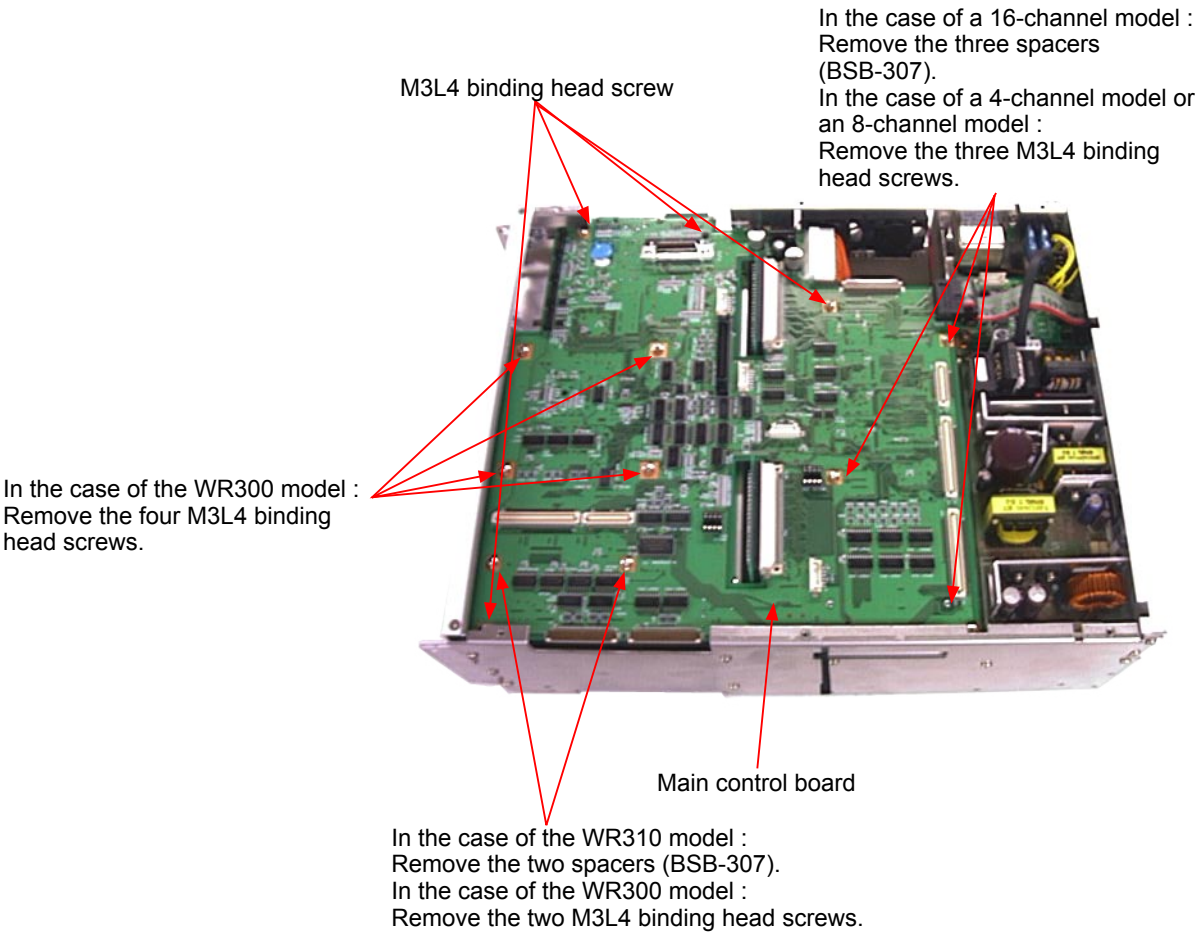
Re-assembly

(1) To attach the 16-channel control board, perform the above "Disassembly" procedure in reverse.

3.10 Replacing the Main Control Board

Disassembly

(1) Detach the bottom cover assembly (see Section 3.3).
(2) Detach the rear cover (see Section 3.4).
(3) Detach the front cover assembly (see Section 3.5).
(4) In the case of a 16-channel model, detach the 16-channel control board (see Section 3.9).
(5) In the case of a 16-channel model, remove the three spacers (BSB-307) holding the main control board.
(6) In the case of an 8-channel model or a 4-channel model, remove the three M3L4 binding head screws holding the main control board.
(7) In the case of the WR310 model, detach the HDD unit assembly (see Section 3.7).
(8) In the case of the WR310 model, remove the four M3L4 binding head screws holding the main control board.
(9) In the case of the WR310 model, remove the two spacers (BSB-307) holding the main control board.
(10) In the case of the WR300 model, remove the ten M3L4 binding head screws holding the main control board.
(11) Disconnect all the cables from the main control board.
(12) Detach the main control board from the AMP mother board.


In the case of a 16-channel model :
Remove the three spacers (BSB-307).
In the case of a 4-channel model or an 8-channel model :
Remove the three M3L4 binding head screws.
M3L4 binding head screw
In the case of the WR300 model :
Remove the four M3L4 binding head screws.
Main control board
In the case of the WR310 model :
Remove the two spacers (BSB-307).
In the case of the WR300 model :
Remove the two M3L4 binding head screws.

Re-assembly

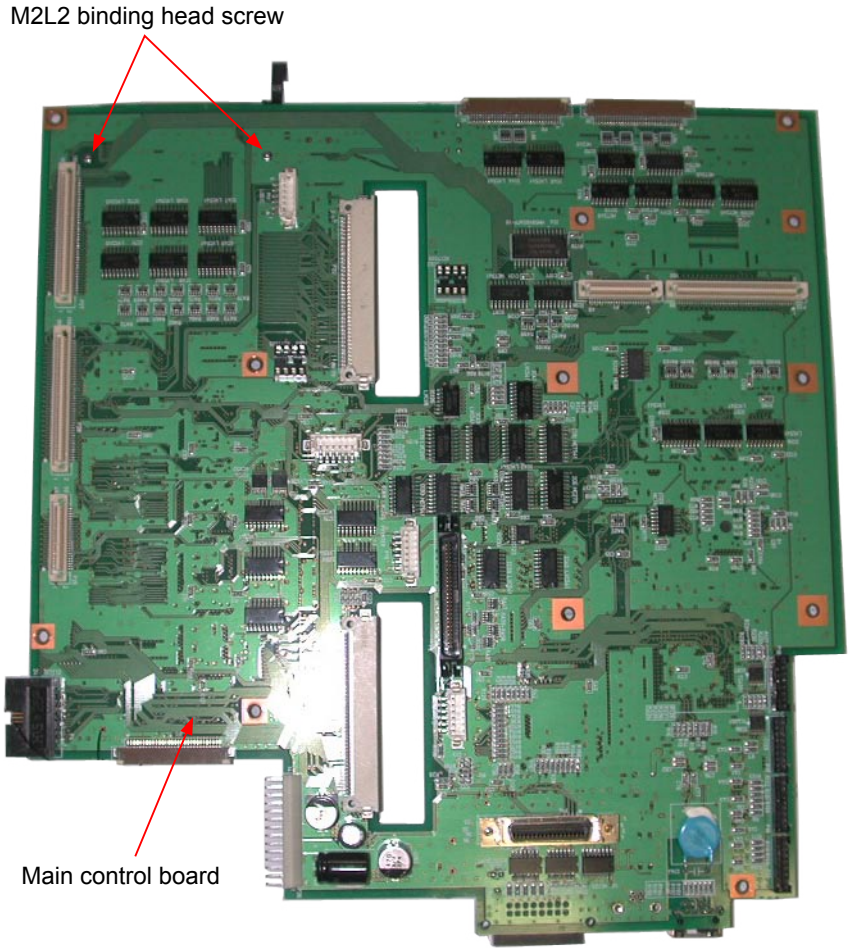
(1) To attach the main control board, perform the above "Disassembly" procedure in reverse.

3.12 Replacing the PCMCIA Card Slot Mechanical Part

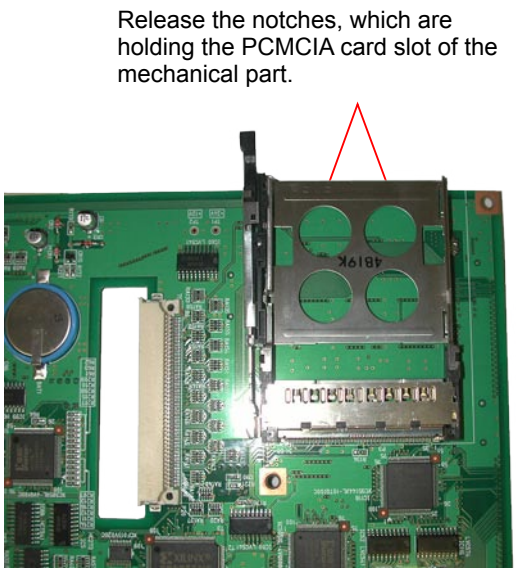
Disassembly

(1) Detach the main control board (see Section 3.12).

(2) Remove the two M2L2 binding head screws holding the PCMCIA card slot mechanical part.



(3) Release the notches using by small flat-head screwdriver, which is holding the PCMCIA card slot of the mechanical part.



(4) Detach the PCMCIA card slot mechanical part as shown below from the main control board.

Re-assembly

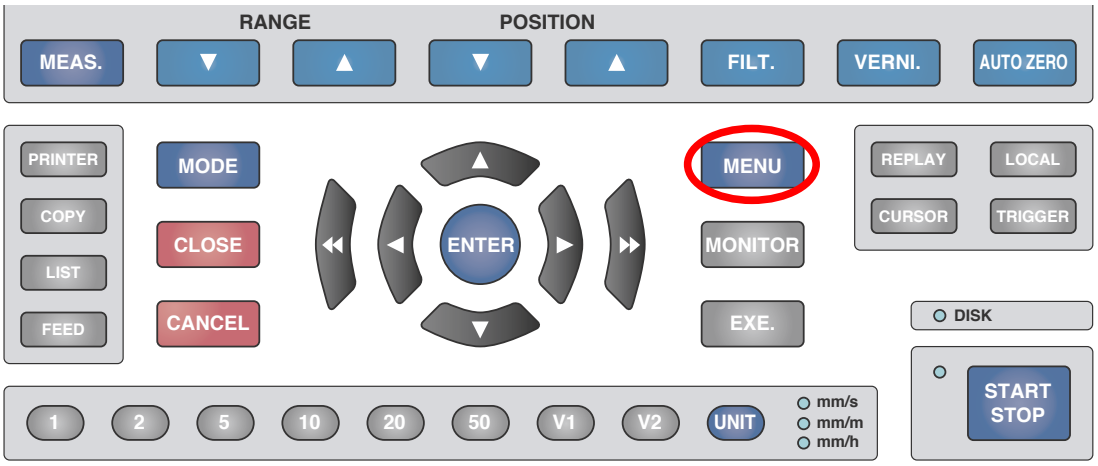
(1) To attach the PCMCIA card slot mechanical part, perform the above "Disassembly" procedure in reverse.

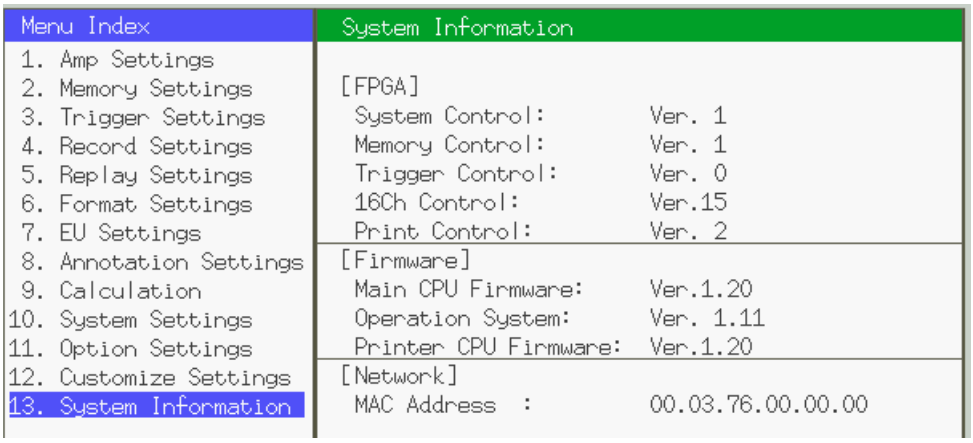
4. SETUP PROCEDURES

The Setup menu is used to perform adjustments to various parts.
Perform adjustments as required for the amplifiers that you have installed.

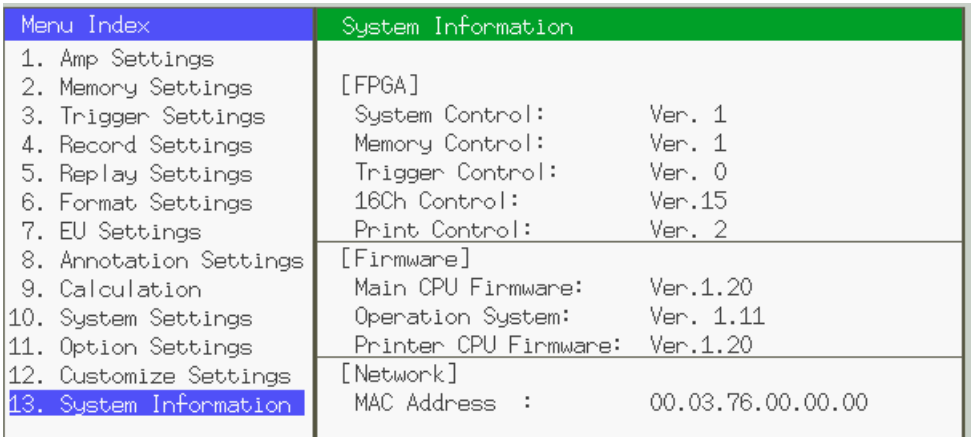
4.1 Entering the System Setup menu

(1) Press the [MENU] key to display the “Menu Index” menu shown below.

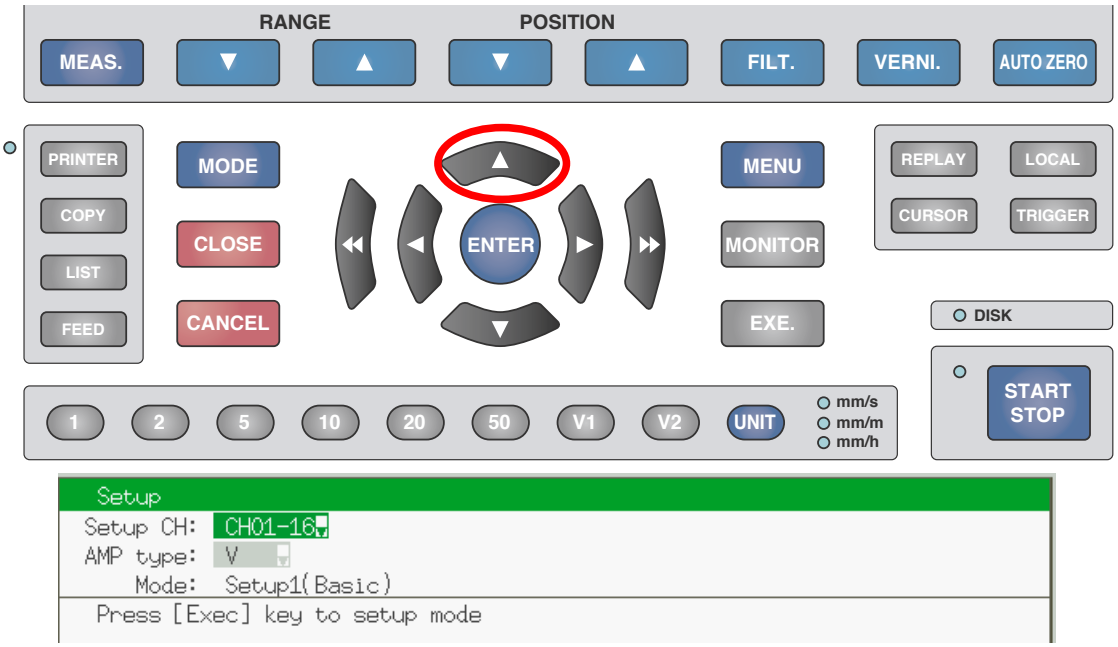




(2) Press the [UP POSITION] key to display the "System Information" menu shown below.



(3) Press the [UP DIRECTION] key ten times to display the "Setup" menu shown below.



(4) In this menu, you can select the Setup channel, the Setup AMP and the Setup Mode.

4.2 Setting Up the M (Multi-Input) Type Amp

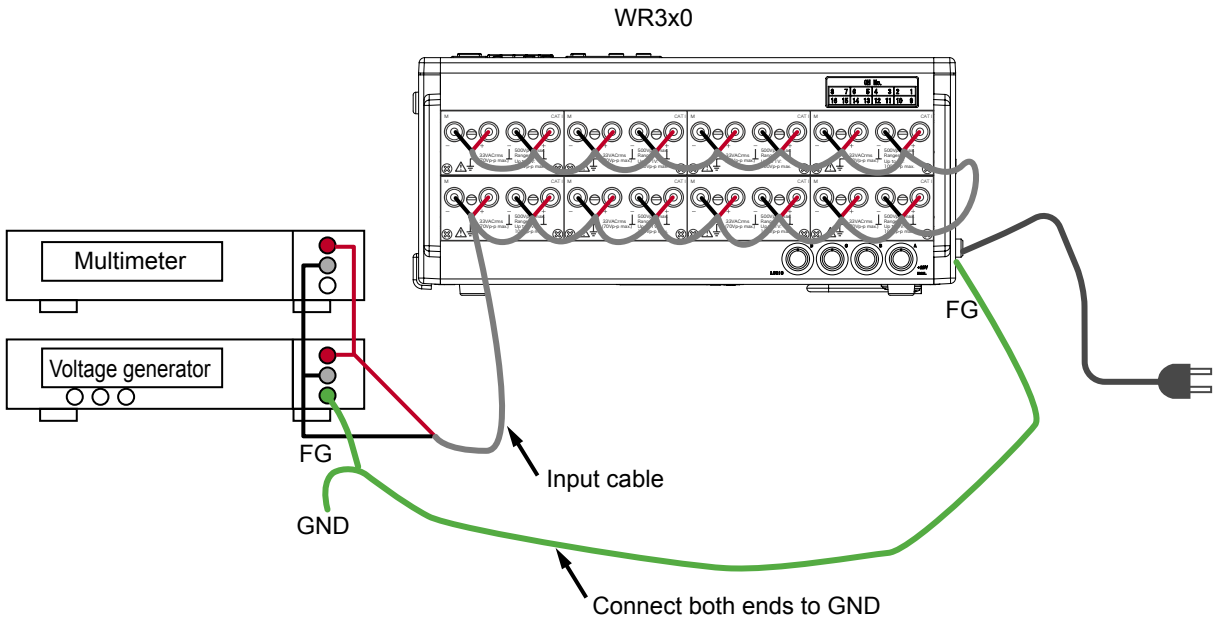
This procedure is required when any part of the M-amp is replaced.
Perform Setup 1 and Setup 2 in this procedure.

4.2.1 Setup 1 (Voltage)

Preparation

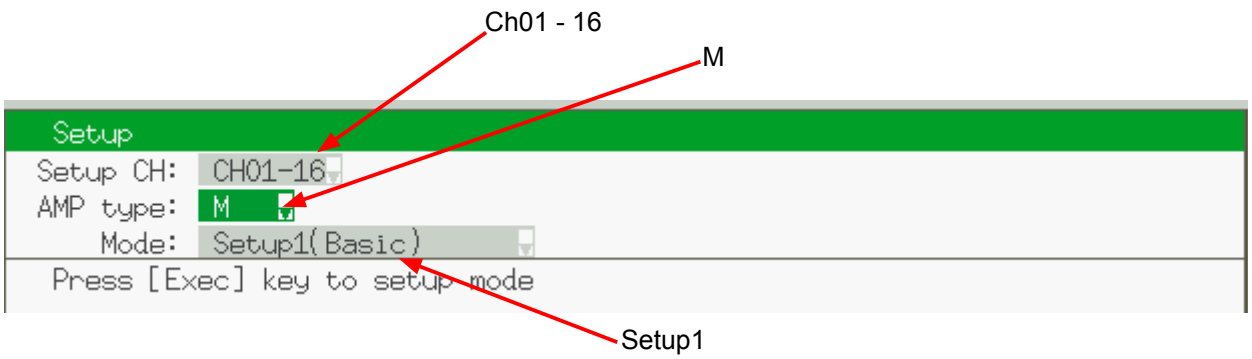
- Have a voltage generator on hand that can output voltage up to 1 VDC (four-digit output).
- Mutually connect the ground terminals of the voltage generator and the WR3x0.

Wiring connection



Setup procedure

(1) As shown in the figure above, connect the output of the voltage generator and the Multimeter to the WR3x0's amp input terminal.
(2) Leave the WR3x0 turned on for at least 30 minutes.
(3) Set the measurement mode to RECORDER mode.
(4) After entering the System Setup mode, open the Setup menu as shown below.
Specify the measurement conditions as shown below.
Setup CH :Ch01-16 or Ch01-08 or Ch01-04
Setup AMP type :M
Mode :Setup1



(5) Press the [EXECUTE] key.

(6) The “GND : [Start] exec.” message is displayed at the location shown above.

(7) Input “0.000mV” to the input terminals of all the channels.

(8) Press the [START/STOP] key and then wait until the "20 mV : [Start] exec." message appears. Specify the voltage generator's output voltage setting to correspond to one of the displayed voltage ranges in the following table, and then input that voltage to the WR3x0.

Message	Input Voltage
20 mV	20.000 mV
50 mV	50.000 mV
100 mV	100.000 mV
200 mV	200.000 mV
500 mV	500.000 mV
1 V	1.000 V

Note

If each displayed voltage is within 60% to 80%, then the amp is OK. But if the voltage differs greatly, the amp needs to be repaired. After repairing the amp, this setup procedure must be performed again.

(9) Repeat step (8) by sequentially setting the Measure parameter to 20 mV, 50 mV, 100 mV, 200 mV, 500 mV and 1 V, and then inputting the corresponding voltage.

(10) When you have finished the Setup operation for 1 V, the "EEPROM : [Exec] to start " message appears. Press the [EXECUTE] key to begin writing the new Setup data to the EEPROM of each amp.

(11) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.

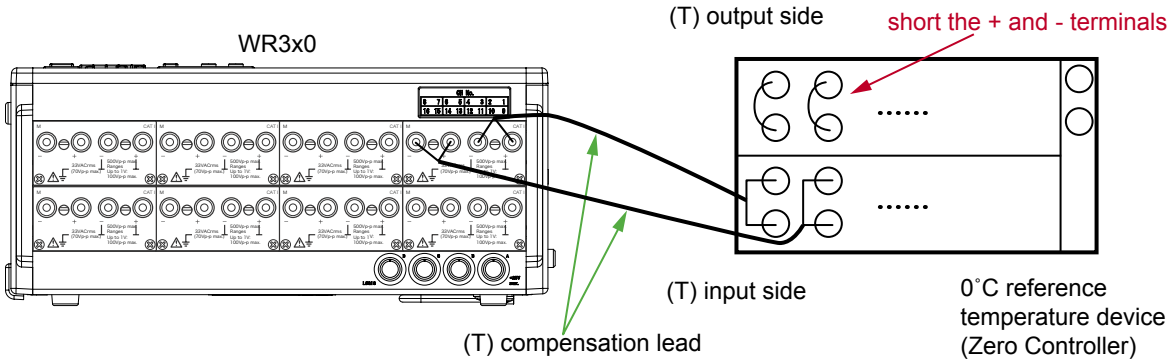
(12) Turn off the WR3x0.
Next, perform "Setup2"

4.2.2 Setup 2 (Room Temperature Compensation)

Preparation

As shown below, use (T) temperature compensation leads to connect the target amps to the 0˚C reference temperature device (Zero controller). Also be sure to use (T) temperature compensation leads to connect the M type amps to each other.

Wiring connection



CAUTION

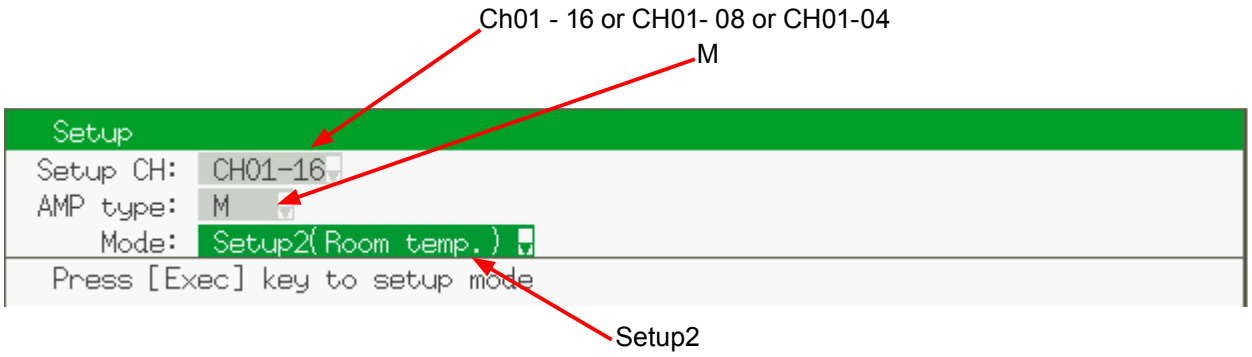
Connect each compensation copper lead to a single terminal as shown in the above diagram (parallel wiring is not permitted).

(1) As shown in the figure above, connect the input of the zero controller to the WR3x0's amp input terminal.

(2) Leave the WR3x0 turned on for at least 30 minutes.

(3) Set the measurement mode to RECORDER mode.

(4) After entering the System Setup mode, open the Setup menu as shown below.
Specify the measurement conditions as shown below.
Setup CH :Ch01-16 or Ch01-08 or Ch01-04
Setup AMP type :M
Mode :Setup2



(5) Press the [EXECUTE] key.

(6) The “rTemp : [Start] exec.” message is displayed at the location shown above.
(7) Press the [START/STOP] key and then wait until the "EEPROM : [Exec] to start " message appears.
(8) Press the [EXECUTE] key to begin writing the new Setup data to the EEPROM of each amp.
(9) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.
(10) Turn off the WR3x0.

This completes the setup of the M type amp(s).

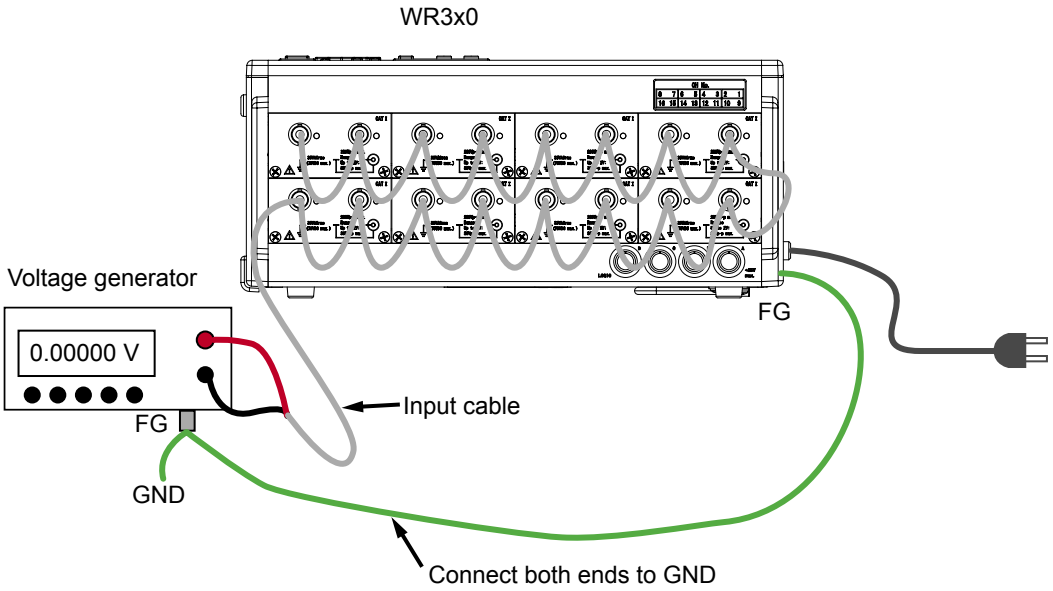
4.3 Setting Up the V (Voltage Input) Type Amp

This procedure is required when any part of the V-amp is replaced.

Preparation

- Have a voltage generator on hand that can output voltage up to 5 VDC (four-digit output).
- Mutually connect the ground terminals of the voltage generator and the WR3x0.

Wiring connection



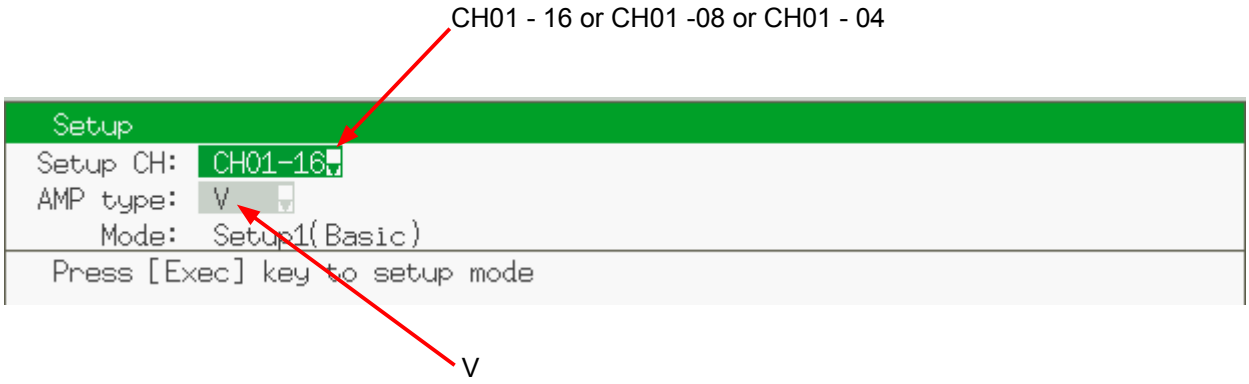
Setup procedure

(1) As shown in the figure above, connect the output of the voltage generator to the WR3x0's amp input terminal.

(2) Leave the WR3x0 turned on for at least 30 minutes.

(3) Set the measurement mode to RECORDER mode.

(4) After entering the System Setup mode, open the Setup menu as shown below.
Specify the measurement conditions as shown below.
Setup CH :Ch01-16 or Ch01-08 or Ch01-04.
Setup AMP type :V



(5) Press the [EXECUTE] key.

(6) The “GND : [Start] exec.” message is displayed at the location shown above.

(7) Input “0.000mV” to the input terminals of all the channels.

(8) Press the [START/STOP] key and then wait until the "50 mV : [Start] exec." message appears. Specify the voltage generator's output voltage setting to correspond to one of the displayed voltage ranges in the following table, and then input that voltage to the WR3x0.

Message	Input Voltage
50 mV	50.000 mV
100 mV	100.000 mV
200 mV	200.000 mV
500 mV	500.000 mV
1 V	1.000 V
2 V	2.000 V
5 V	5.000 V

Note

If each displayed voltage is within 70% to 90%, then the amp is OK. But if the voltage differs greatly, the amp needs to be repaired. After repairing the amp, this setup procedure must be performed again.

(9) Repeat step (8) by sequentially setting the Measure parameter to 50 mV, 100 mV, 200 mV, 500 mV, 1V, 2 V, and 5 V, and then inputting the corresponding voltage.

(10) When you have finished the Setup operation for 5 V, the "EEPROM : [Exec] to start " message appears. Press the [EXECUTE] key to begin writing the new Setup data to the EEPROM of each amp.

(11) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.

(12) Turn off the WR3x0.

This completes the setup of the V type amp(s).

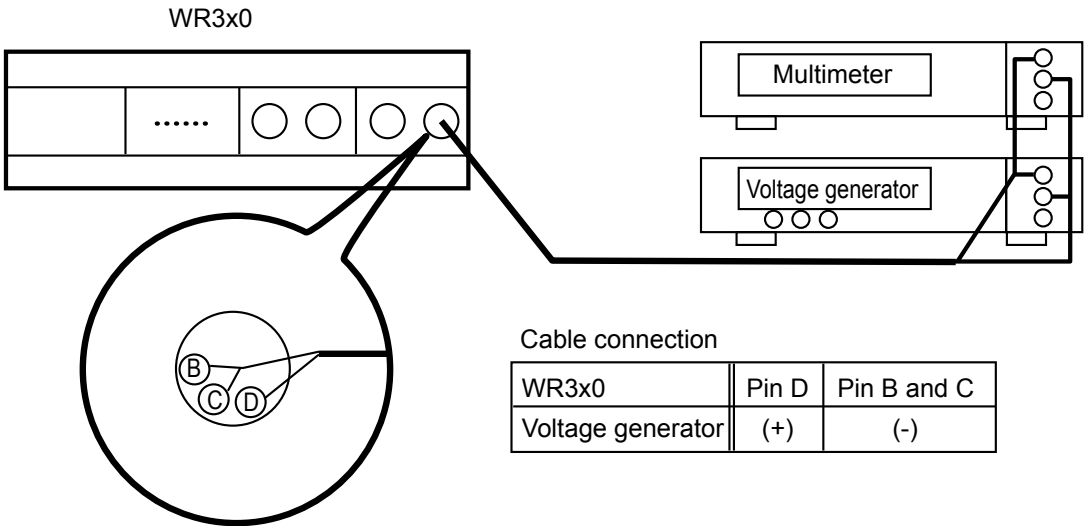
4.4 Setting Up the DCB Type Amp

This procedure is required when any part of the DCB-amp is replaced.

Preparation

As shown below, use a multimeter and voltage generator.

Wiring connection



Cable connection

WR3x0	Pin D	Pin B and C
Voltage generator	(+)	(-)

Note

Mutually connect the ground terminals of the voltage generator and the WR3x0.

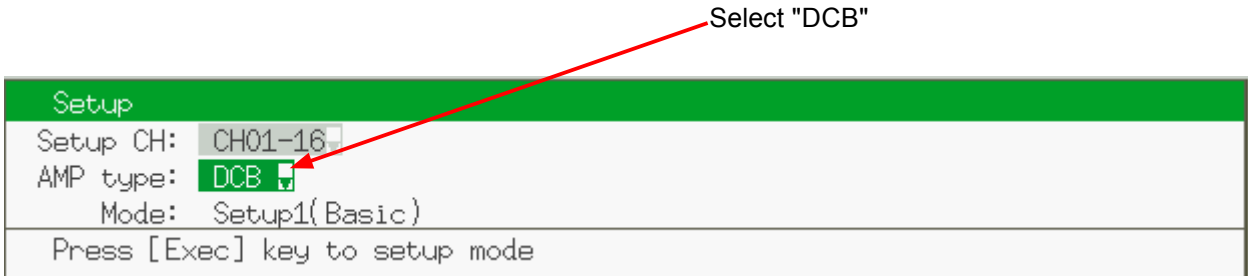
Setup procedure

(1) Connect the voltage generator (Low noise type, YEW2553 compatible model).
Connect the multimeter to the voltage generator in parallel.

(2) Leave the WR3x0 turned on for at least 30 minutes.

(3) Set the measurement mode to RECORDER mode.

(4) After entering the System Setup mode, open the Setup menu as shown below.
Specify the measurement conditions as shown below.
Setup CH :Ch01-16 or Ch01-08
Setup AMP type :DCB



(5) Press the [EXECUTE] key.

(6) The “BAL : [Start] to start.” message is displayed at the location shown above.

(7) Input “0.000 mV” to the input terminals of all the channels.

Note

Adjust the voltage within 0.0005 mV to -0.0005 mV using the multimeter.

(8) Press the [START/STOP] key and then wait until the "GND : [Start] to start." message appears.

(9) Press the [START/STOP] key and then wait until the "1m strain : [Start] to start." message appears.
Specify the voltage generator's output voltage setting to correspond to one of the displayed voltage ranges in the following table, and then input that voltage to the WR3x0.

Message	Input Voltage
1 m strain	0.9995 to 1.0005 mV
2 m strain	1.999 to 2.001 mV
5 m strain	4.998 to 5.002 mV
10 m strain	9.995 to 10.005 mV
20 m strain	19.99 to 20.01 mV

Note

If each displayed voltage is within 60% to 80%, then the amp is OK. But if the voltage is differs greatly, the amp needs to be repaired. After repairing the amp, this setup procedure must be performed again.

(10) Repeat step (9) by sequentially setting the Measure parameter to 1 m strain, 2 m strain, 5 m strain, 10 m strain and 20 m strain, and then inputting the corresponding voltage.

(11) When you have finished the Setup operation for 20 m strain, the "EEPROM : [Exec] to start " message appears.
Press the [EXECUTE] key to begin writing the new Setup data to the EEPROM of each amp.

(12) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.

(13) Turn off the WR3x0.

This completes the setup of the DCB type amp(s).

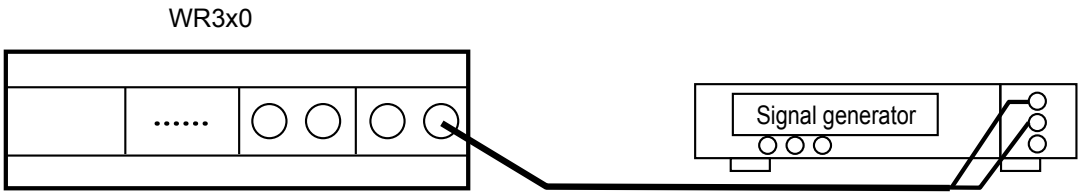
4.5 Setting Up the F/V Type Amp

This procedure is required when any part of the F/V-amp is replaced.

Preparation

As shown below, use a signal generator.

Wiring connection

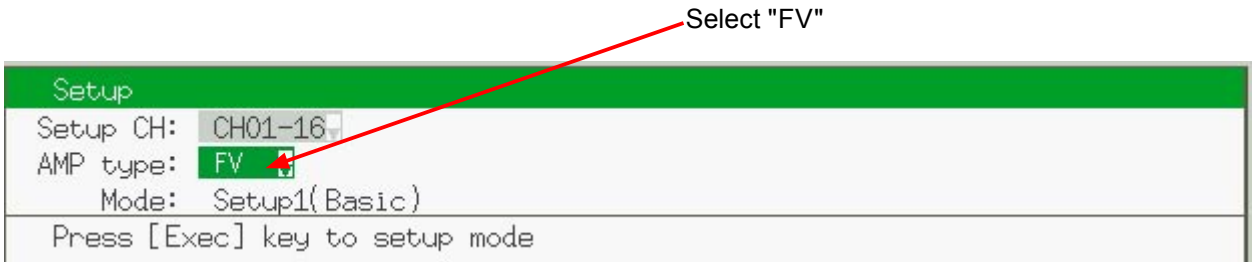


Note

Mutually connect the ground terminals of the signal generator and the WR3x0.

Setup procedure

(1) Connect a signal generator which generates exactly 40 kHz to the F/V amp input terminal.
(2) Leave the WR3x0 turned on for at least 30 minutes.
(3) Set the measurement mode to RECORDER mode.
(4) After entering the System Setup mode, open the Setup menu as shown below.
Specify the measurement conditions as shown below.
Setup CH :Ch01-16 or Ch01-08 or Ch01-04
Setup AMP type :FV



(5) Press the [EXECUTE] key.

(6) The “GND : [Start] to start.” message is displayed at the location shown above.
(7) Input “+/- 5 V / 0 Hz(⎍)” to the input terminals of all the channels.
(8) Press the [START/STOP] key and then wait until the "40KHz : [Start] to start." message appears.
(9) Input “+/- 5 V / 40 KHz(⎍)” to the input terminals of all the channels.

Note

If each displayed frequency is within 34 kHz to 38 kHz, then the amp is OK. But if the voltage differs greatly, the amp needs to be repaired. After repairing the amp, this setup procedure must be performed again.

(10) Press the [START/STOP] key and then wait until the "EEPROM : [Exec] to start " message appears. Press the [EXECUTE] key to begin writing the new Setup data to the EEPROM of each amp.
(11) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.
(12) Turn off the WR3x0.

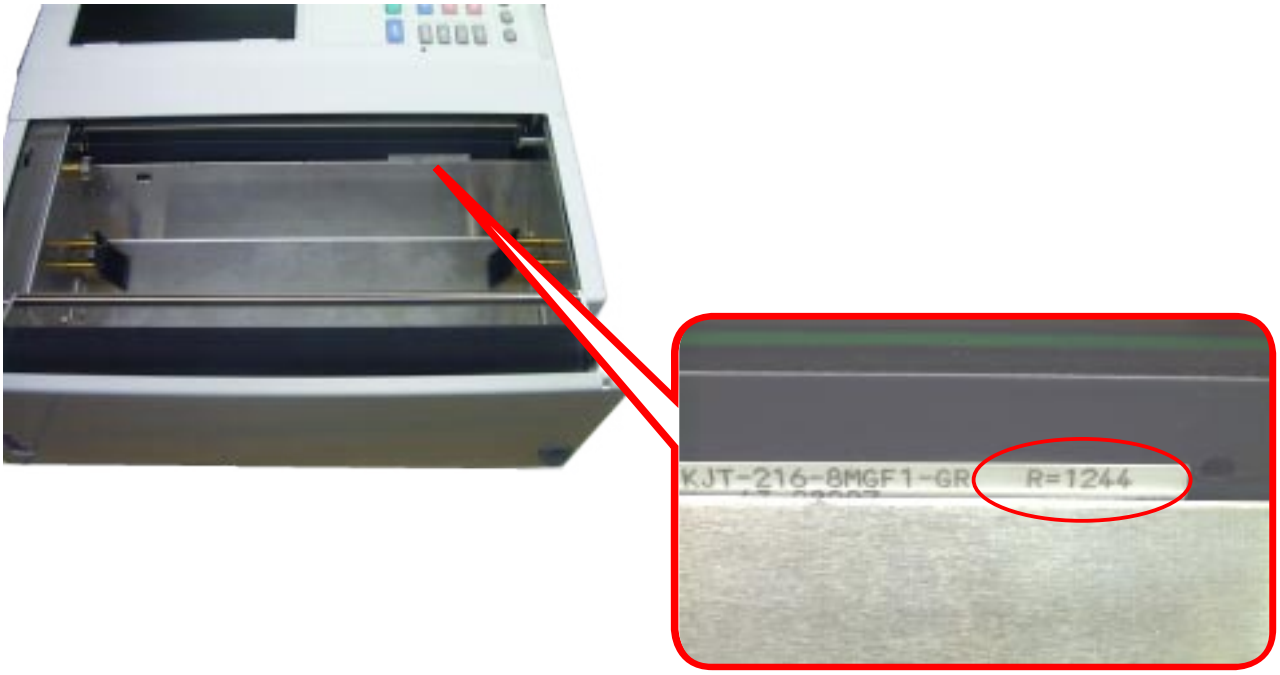
This completes the setup of the F/V type amp(s).

4.6 Setting Up the Printer Head Resistance for the Printer

This procedure is required when the printer is replaced.

Preparation for the 200-mm Width Printer

(1) Get the printer head resistance value of the printer from the label on the option printer unit as shown below.



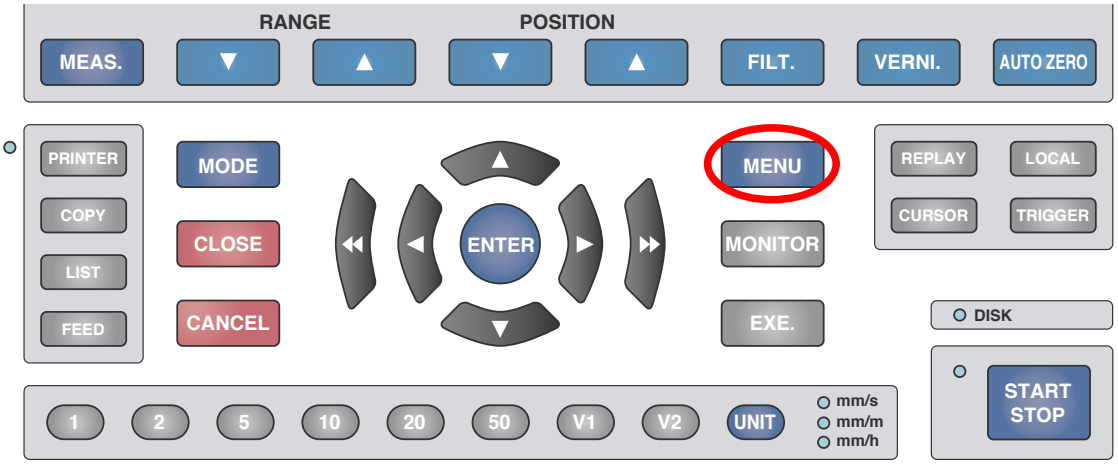
(2) For example, the label shown above has a marking "R=1244", so the printer head resistance value will be 1201-1290 Ohm.

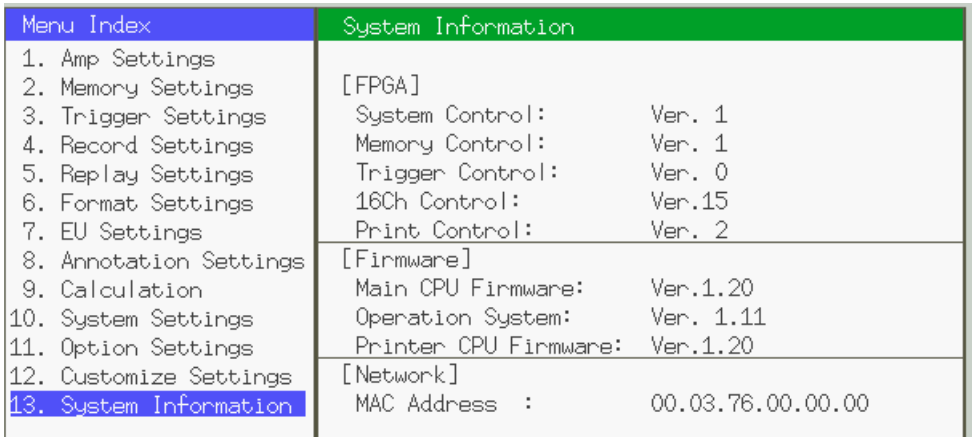
Preparation for the 100-mm Width Printer

(1) The 100-mm width printer use a fixed value for the printer head resistance value, so the printer head resistance value is "680-740 Ohm".

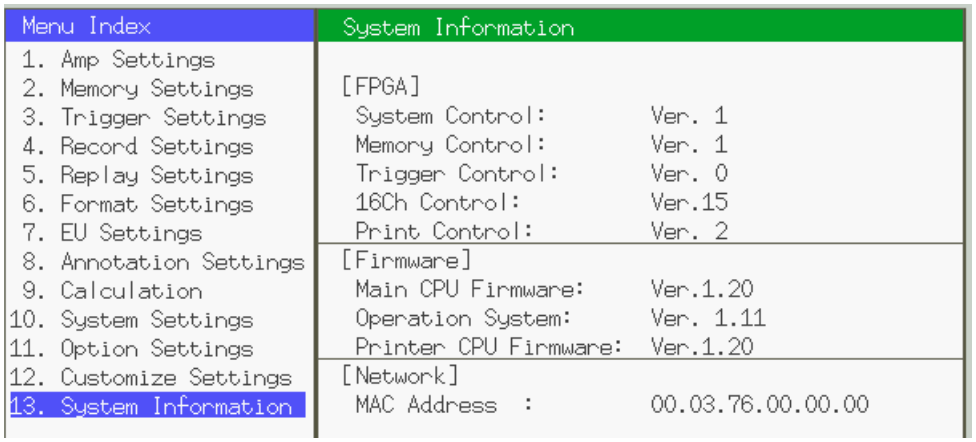
Setup procedure

(1) Press the [MENU] key to display the “Menu Index” menu shown below.

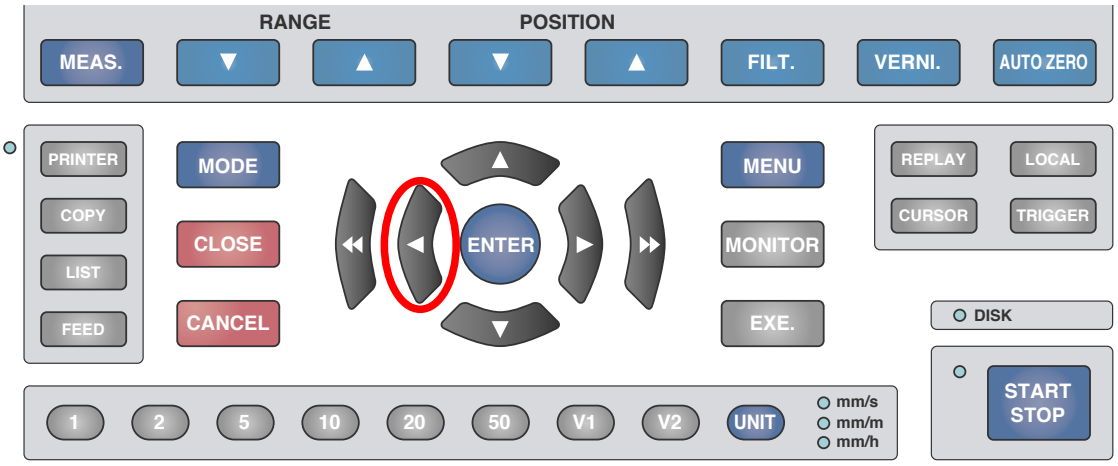




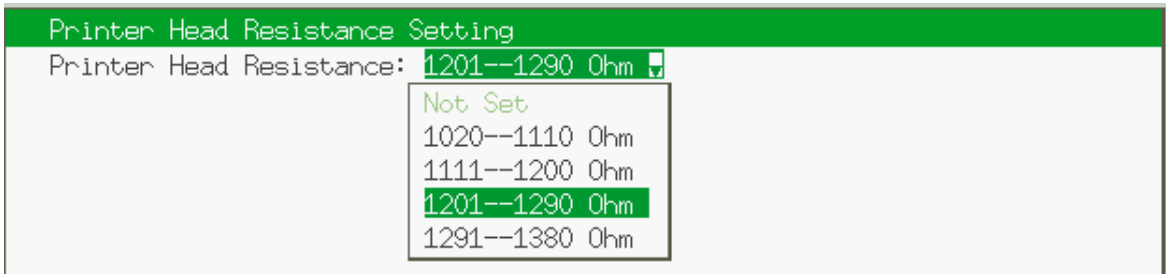
(2) Press the [UP POSITION] key to display the "System Information" menu shown below.



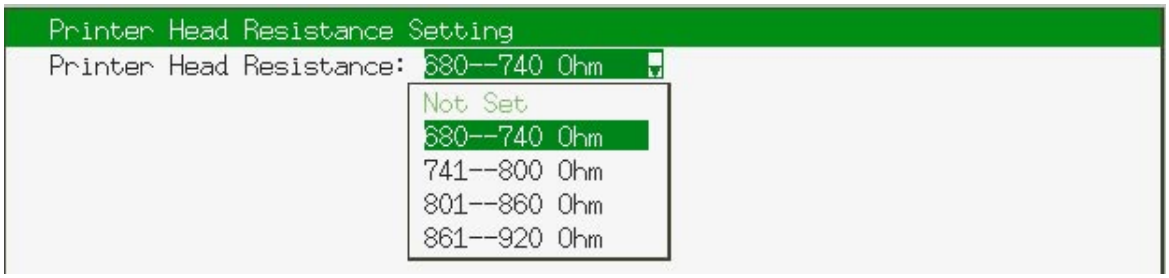
(3) Press the [LEFT DIRECTION] key ten times to display the "Printer Head Resistance Setting " menu shown below.



200-mm width printer head



100-mm width printer head



(4) Select the Printer Head Resistance and then press the [ENTER] key.

(5) Turn off the WR3x0

5. INSPECTION AND CHECK PROCEDURES

5.1 Insulation Resistance

Use a megohm meter (an insulation resistance gauge) to check that the insulation resistance between the following terminals are equal to or higher than the rated values.

Item	Measuring terminals	Rated value	Remarks
V-amp	SIG(-) to FG	Megohm meter with an output capacity of 500 VDC, insulation resistance is 100 M ohm or more.	All channels
M-amp			
F/V-amp			
DCB-amp	SIG(C) to FG		
AC inlet	AC(Line) to FG	Megohm meter with an output capacity of 500 VDC, and an insulation resistance of 20 M ohm or more.	Line input

5.2 Inspection and Check Methods

5.2.1 Measurement Accuracy

Supply the reference voltage or frequency determined for each measurement range to each installed amp, and then check the voltage or frequency accuracy.

Preparation

- Use a voltage generator for the V, M and DCB amps that can output up to 500 VDC (using four-digit settings).
- Use a signal generator for the F/V amp that can output rectangular waveforms, 0.0 Hz to 50 kHz frequency, 10 Vp-p AMPTD.
- Mutually connect the ground terminals of the voltage generator and the WR3x0 prior to initiating measurement.

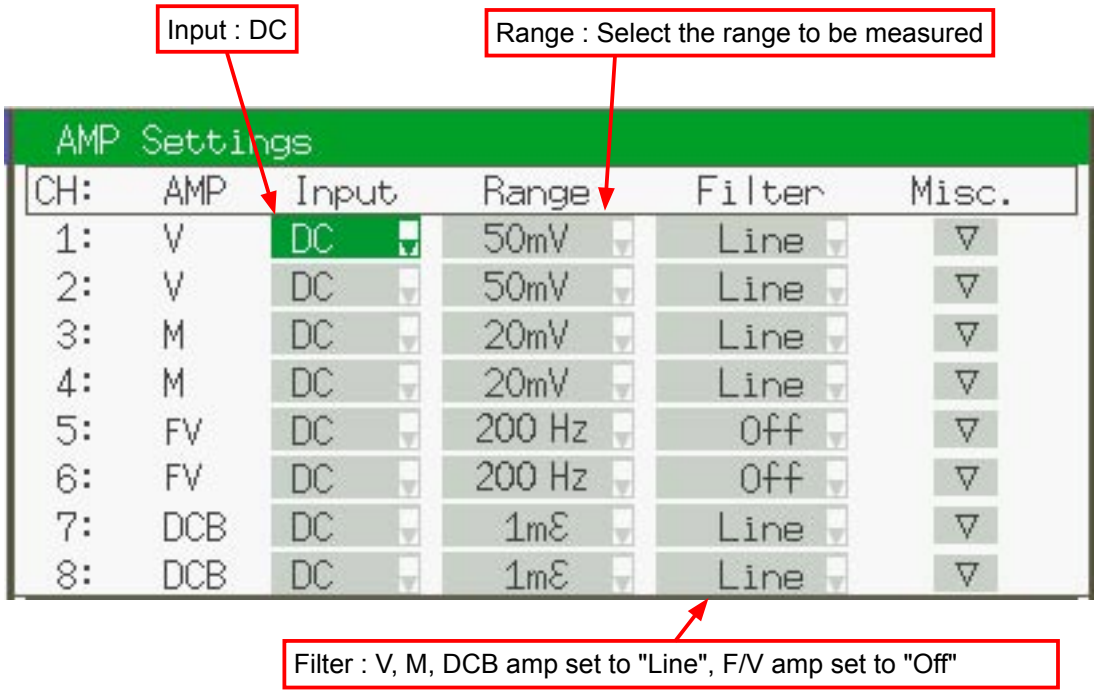
Wiring Connection

Same wiring connection as the V, M, DCB or F/V amp setup. (See setup procedure)

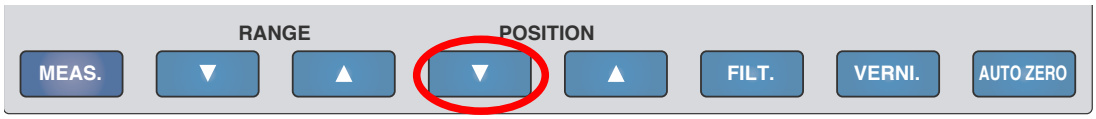
Setting Procedure

(1) Press the [MENU] key to display the "AMP setting" window as shown below, and then make the following settings.

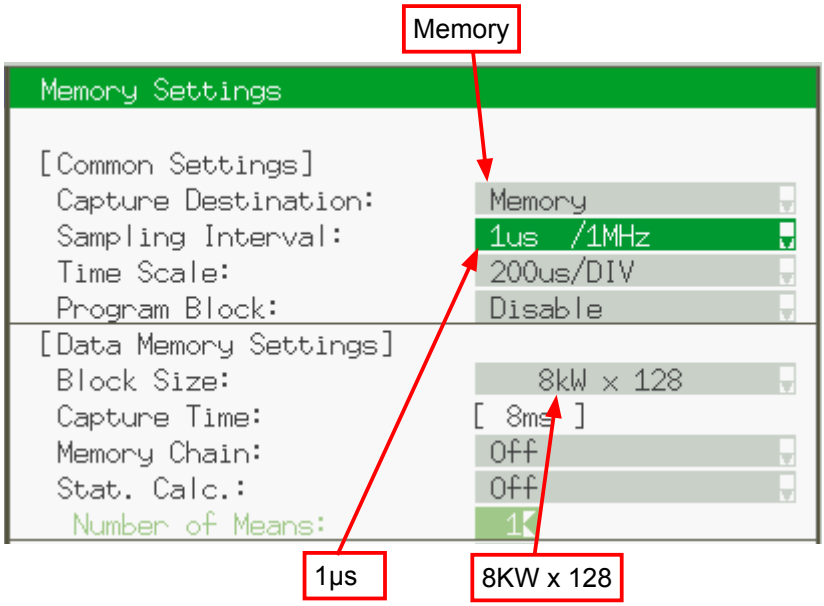
AMP : V, M, DCB or F/V (select the measuring amp)
Input : DC
Range : Select the range to be measured
Filter : V, M, DCB amp set to "Line", F/V amp set to "Off"


Input : DC
Range : Select the range to be measured
AMP Settings
CH: AMP Input Range Filter Misc.
1: V DC 50mV Line
2: V DC 50mV Line
3: M DC 20mV Line
4: M DC 20mV Line
5: FV DC 200 Hz Off
6: FV DC 200 Hz Off
7: DCB DC 1mℇ Line
8: DCB DC 1mℇ Line
Filter : V, M, DCB amp set to "Line", F/V amp set to "Off"

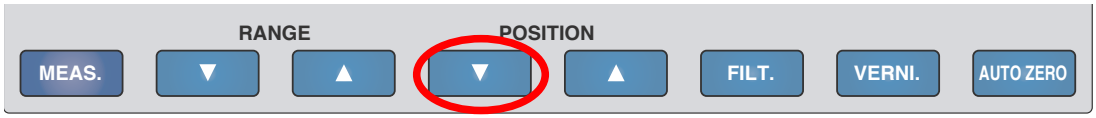
(2) Press the [DOWN POSITION] key to display the "Memory Settings" menu shown below, and then make the following settings.



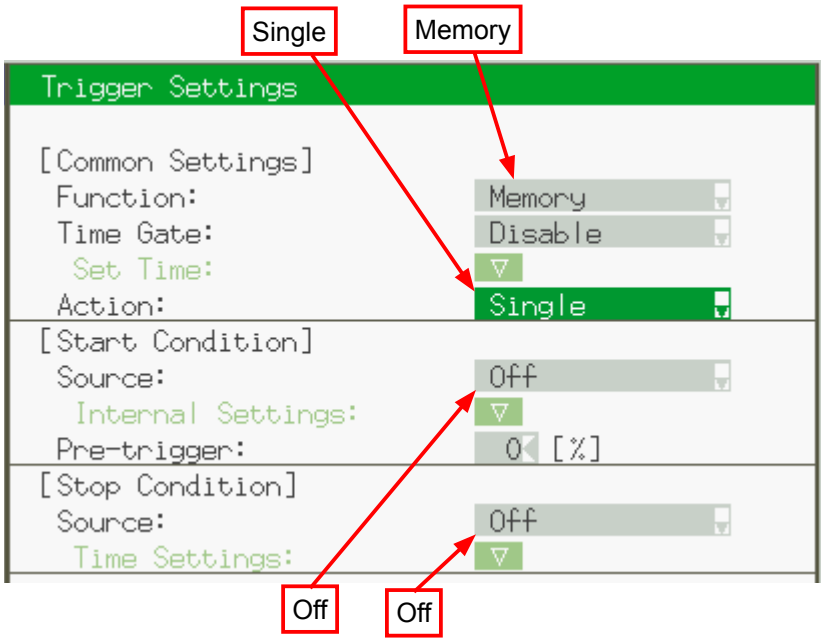
Capture Destination : Memory
Sampling Interval : 1 µs
Block Size : 8 KW x 128



(3) Press the [DOWN POSITION] key to display the "Trigger Settings" window as shown below, and then make the following settings.

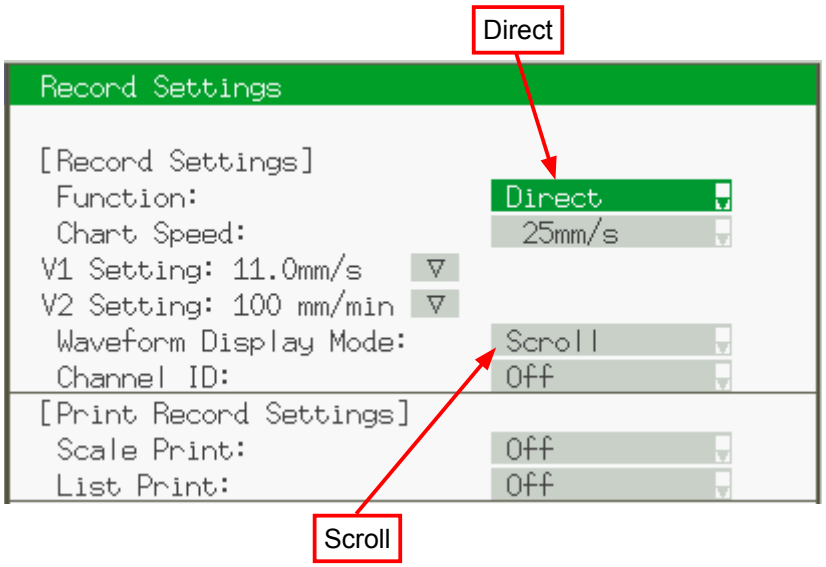


Function : Memory
Action : Single
Start Condition Source : Off
Stop Condition Source : Off



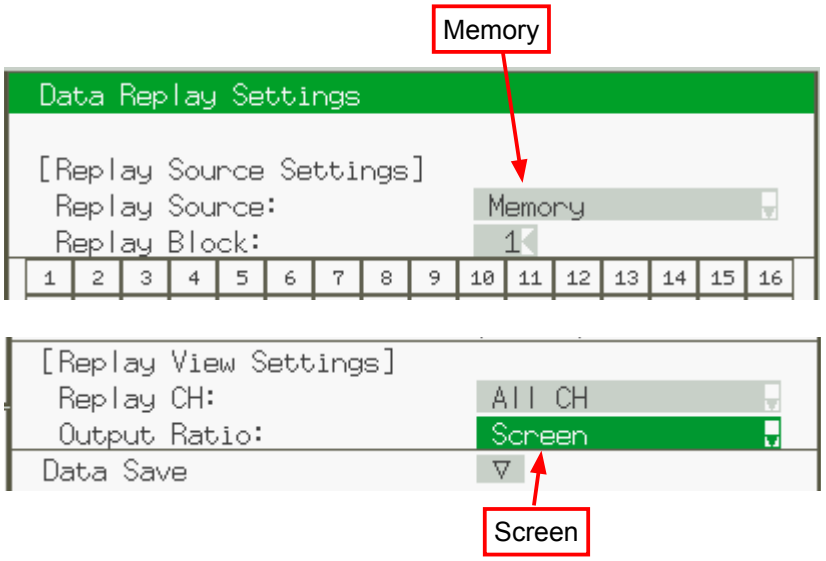
(4) Press the [DOWN POSITION] key to display the "Record Settings" window as shown below, and then make the following settings.

Function : Direct
Waveform Display Mode : Scroll



(5) Press the [DOWN POSITION] key to display the "Data Replay Settings" window as shown below, and then make the following settings.

Replay Source : Memory
Output Ratio : Screen



Measurement procedure for V and M amps

(1) Input the reference voltage for each range according to the table below, and then check that the level of measurement is within the rating.

V amp : Voltage precision ratings		
Range	Input voltage	Rating (±0.2% of F.S.)
50 mV	0.00 mV	±0.1 mV
	+50.00 mV	
	-50.00 mV	
100 mV	0.00 mV	±0.2 mV
	+100.00 mV	
	-100.00 mV	
200 mV	0.0 mV	±0.4 mV
	+200.0 mV	
	-200.0 mV	
500 mV	0.00 mV	±1 mV
	+500.0 mV	
	-500.0 mV	
1 V	0.000 V	±0.002 V
	+1.000 V	
	-1.000 V	
2 V	0.000 V	
	+2.000 V	±0.004 V
	-2.000 V	
5 V	0.000 V	±0.01 V
	+5.00 V	
	-5.00 V	
10 V	+10.00 V	±0.02 V
20 V	+20.00 V	±0.04 V
50 V	+50.00 V	±0.1 V
100 V	+100.00 V	±0.2 V
200 V	0.000 V	±0.4 V
	+200.00 V	
	-200.00 V	

M amp : Voltage precision ratings		
Range	Input voltage	Rating (±0.2% of F.S.)
20 mV	0.00 mV	±0.04 mV
	+20.00 mV	
	-20.00 mV	
50 mV	0.00 mV	±0.1 mV
	+50.00 mV	
	-50.00 mV	
100 mV	0.00 mV	±0.2 mV
	+100.00 mV	
	-100.00 mV	
200 mV	0.0 mV	±0.4 mV
	+200.0 mV	
	-200.0 mV	
500 mV	0.0 mV	±1 mV
	+500.0 mV	
	-500.0 mV	
1 V	0.000 V	±0.002 V
	+1.000 V	
	-1.000 V	
2 V	0.000 V	±0.004 V
	+2.000 V	
	-2.000 V	
5 V	+5.000 V	±0.01 V
10 V	+10.00 V	±0.02 V
20 V	+20.00 V	±0.04 V
50 V	+50.00 V	±0.1 V
100 V	+100.0 V	±0.2 V
200 V	0.0 V	±0.4 V
	+200.0 V	
	-200.0 V	
500 V	+500.0 V	±1 V

(2) Press the [START/STOP] key and then wait until the "Finished" message is displayed.

(3) Press the [START/STOP] key to stop measurement.

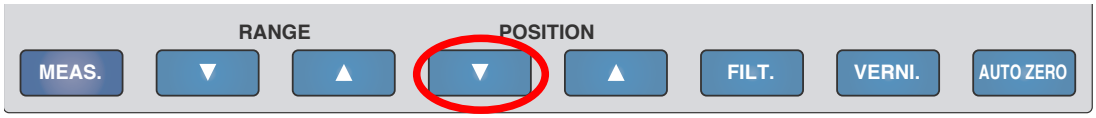
(4) Press the [REPLAY] key to display the waveform.

(5) Press the [CURSOR] key twice to display the two cursors.

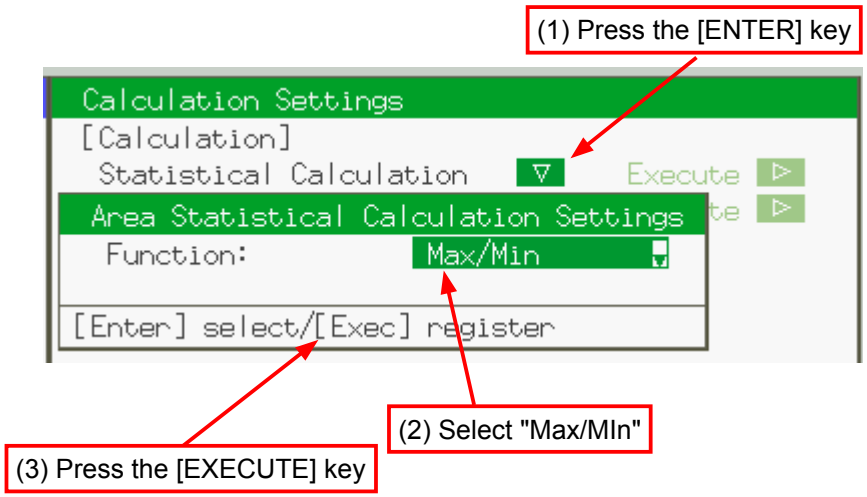
Note : Two cursors are displayed.

(6) Press the [MENU] key.

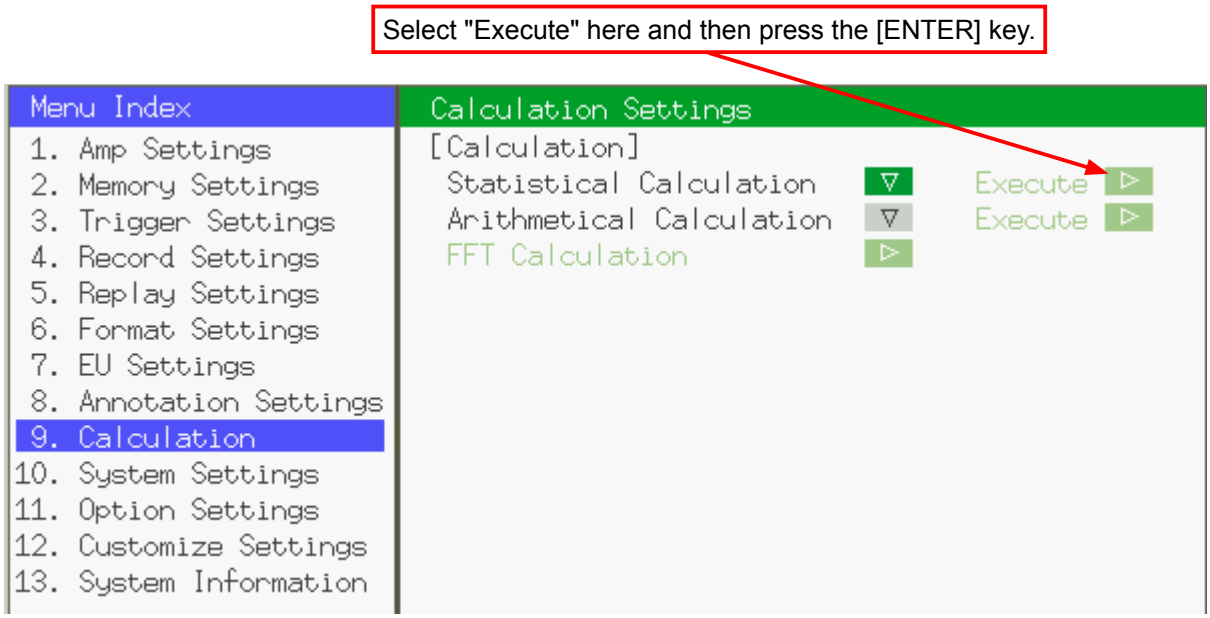
(7) Press the [DOWN POSITION] key until the "Calculation Settings" window as shown below appears, and then make the following settings.



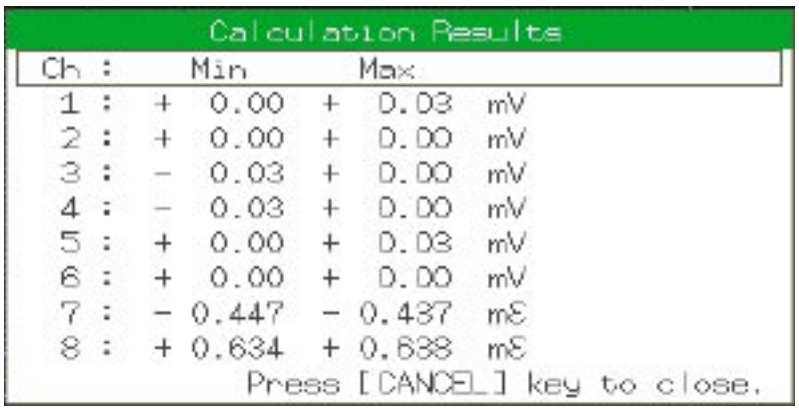
Function : Max/Min



(8) Select "Execute" and then press the [ENTER] key to start calculation.



(9) The following Max/Min values window is displayed.
Confirm that the values are within the ratings.


Calculation Results
Ch : Min Max
1 : + 0.00 + 0.03 mV
2 : + 0.00 + 0.00 mV
3 : - 0.03 + 0.00 mV
4 : - 0.03 + 0.00 mV
5 : + 0.00 + 0.03 mV
6 : + 0.00 + 0.00 mV
7 : - 0.447 - 0.437 mℇ
8 : + 0.634 + 0.638 mℇ
Press [CANCEL] key to close.

Note : Press the [Mode] key to change the measurement range.

Measurement procedure for the DCB amp

(1) Input the reference voltage for each range according to the table below, and then check that the level of measurement is within the rating.

DCB amp : Voltage precision ratings		
Range	Input voltage	Rating (±0.25% of F.S.)
1 m strain	0.000 mV	±0.01 m strain.....Note 1
	+0.500 mV	±0.0035 m strain.....Note 2
	+1.000 mV	
	-0.500 mV	
	-1.000 mV	
2 m strain	0.000 mV	±0.01 m strain.....Note 1
	+2.000 mV	±0.006 m strain.....Note 2
5 m strain	0.000 mV	±0.0135 m strain.....Note 1
	+5.000 mV	±0.0135 m strain.....Note 2
10 m strain	0.000 mV	±0.026 m strain.....Note 1
	+10.000 mV	±0.026 m strain.....Note 2
20 m strain	0.000 mV	±0.051 m strain.....Note 1
	+20.000 mV	±0.051 m strain.....Note 2

Note 1 : Confirm that the value is within the above tolerance after performing Auto balance.

Note 2. : Confirm that the value is within the above tolerance after subtracting the 0 position value.

<Example>

0 : 0.003 m strain..... The value is within 0.01 m, and it is OK.

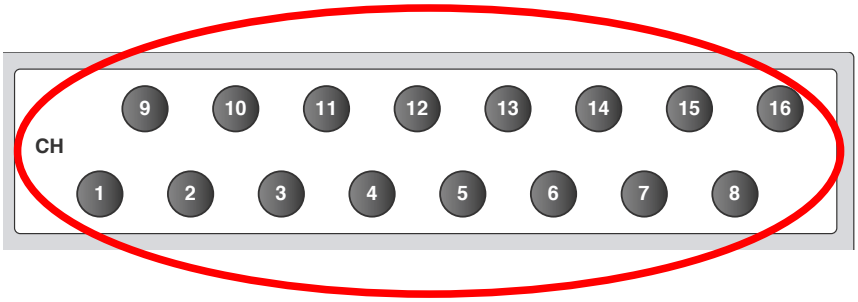
1 m : 1.005 m strain..... 1.005 m - 0.003 m = 1.002 m, it is within 0.0035 m, and it is OK.

Perform Auto balance before measuring 0 % of each range.

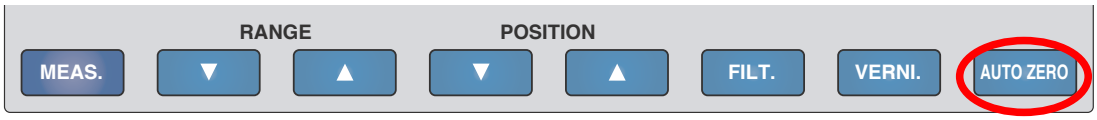
Auto balance procedure

(a) Input "0.000 mV (+0.0005 mV to -0.0005 mV)" to the input terminals of all the channels.

(b) Press the [Channel number] key of the AMP for which you are going to perform auto balance.



(c) Press the [AUTO ZERO] key to perform Auto balance.



(d) Wait until the "Adjusting" message disappears.

Be sure to perform Auto balance after changing the measurement range.

(2) Press the [START/STOP] key and then wait until the "Finished" message is displayed.

(3) Press the [START/STOP] key to stop measurement.

(4) Press the [REPLAY] key to display the waveform.

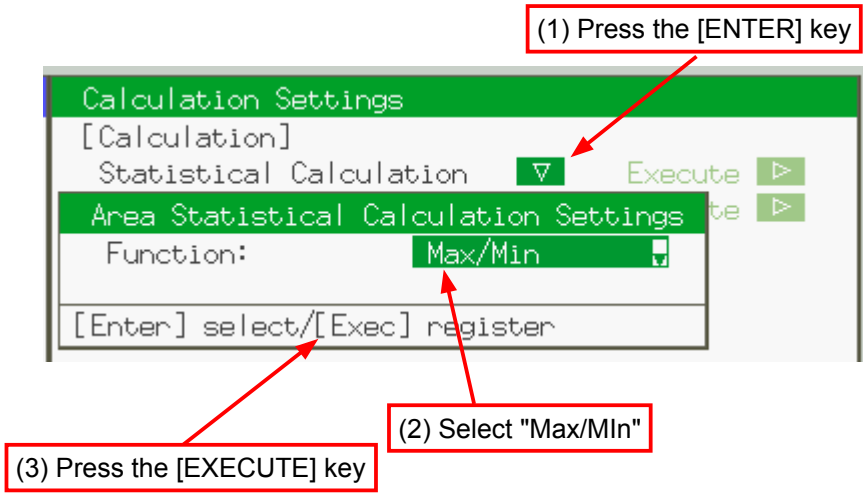
(5) Press the [CURSOR] key twice to display the two cursors.

Note : Two cursors are displayed.

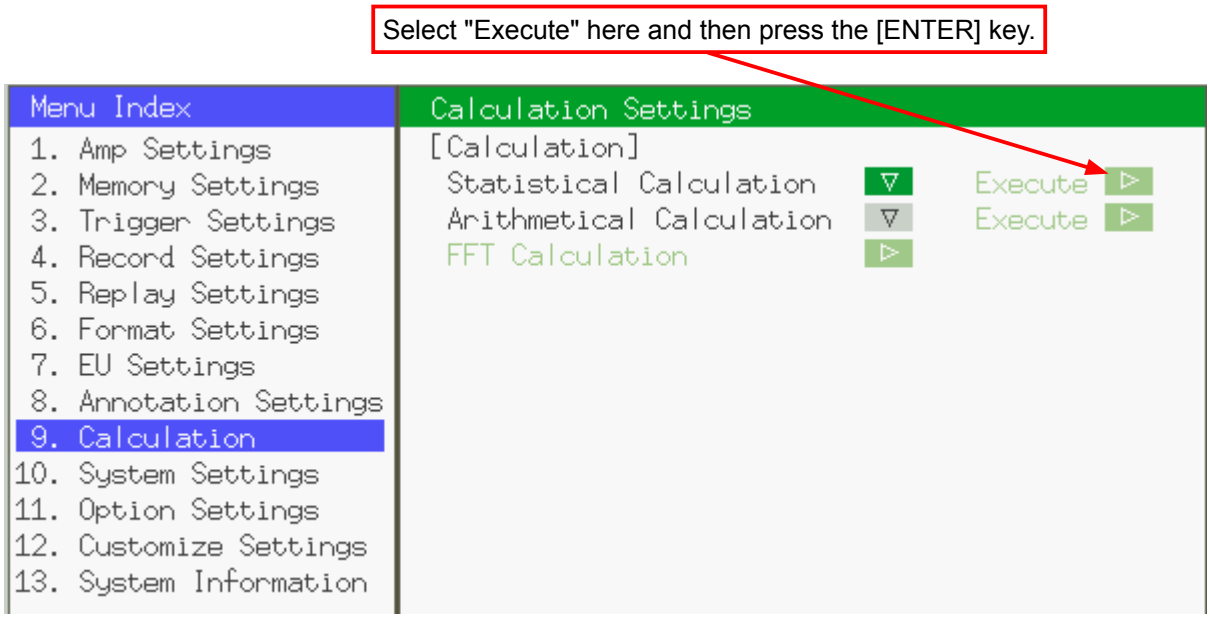
(6) Press the [MENU] key.

(7) Press the [DOWN POSITION] key until the "Calculation Settings" window as shown below appears, and then make the following settings.

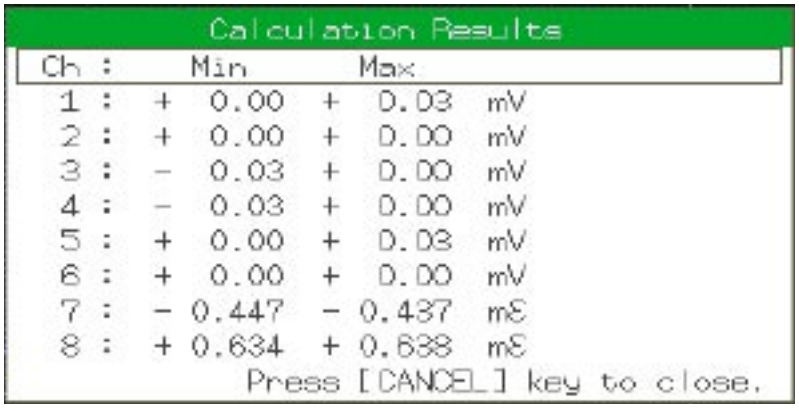
Function : Max/Min



(8) Select "Execute" and then press the [ENTER] key to start calculation.



(9) The following Max/Min values window is displayed.
Confirm that the values are within the ratings.


Calculation Results
Ch : Min Max
1 : + 0.00 + 0.03 mV
2 : + 0.00 + 0.00 mV
3 : - 0.03 + 0.00 mV
4 : - 0.03 + 0.00 mV
5 : + 0.00 + 0.03 mV
6 : + 0.00 + 0.00 mV
7 : - 0.447 - 0.437 mE
8 : + 0.634 + 0.638 mE
Press [CANCEL] key to close.

Note : Press the [Mode] key to change the measurement range.

Measurement procedure for the F/V amp

(1) Input the reference signal for each range according to the table below, and then check that the level of measurement is within the rating.

F/V amp : Signal precision ratings		
Range	Input Frequency	Rating (±0.4% of F.S.)
200 Hz	0.0 Hz*1	±0.8 Hz
	100.0 Hz	
	200.0 Hz	
400 Hz	400 Hz	±1.6 Hz
500 Hz	500 Hz	±2 Hz
1 kHz	1.000 kHz	±0.004 kHz
2 kHz	2.000 kHz	±0.008 kHz
4 kHz	4.000 kHz	±0.016 kHz
5 kHz	5.000 kHz	±0.02 kHz
10 kHz	10.00 kHz	±0.04 kHz
20 kHz	20.00 kHz	±0.08 kHz
40 kHz	40.00 kHz	±0.16 kHz

*1 : Short the +/- terminals, if you cannot input 0 Hz.

Function generator output

AMPTD : 10 V p-p

FCTN : rectangular wave (⎍)

(2) Press the [START/STOP] key and then wait until the "Finished" message is displayed.

(3) Press the [START/STOP] key to stop measurement.

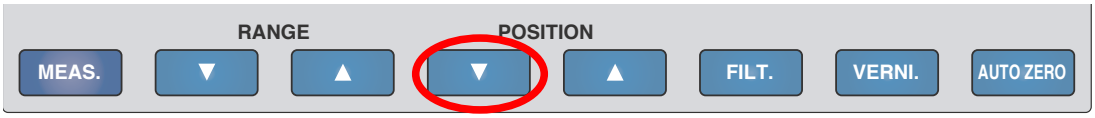
(4) Press the [REPLAY] key to display the waveform.

(5) Press the [CURSOR] key twice to display the two cursors.

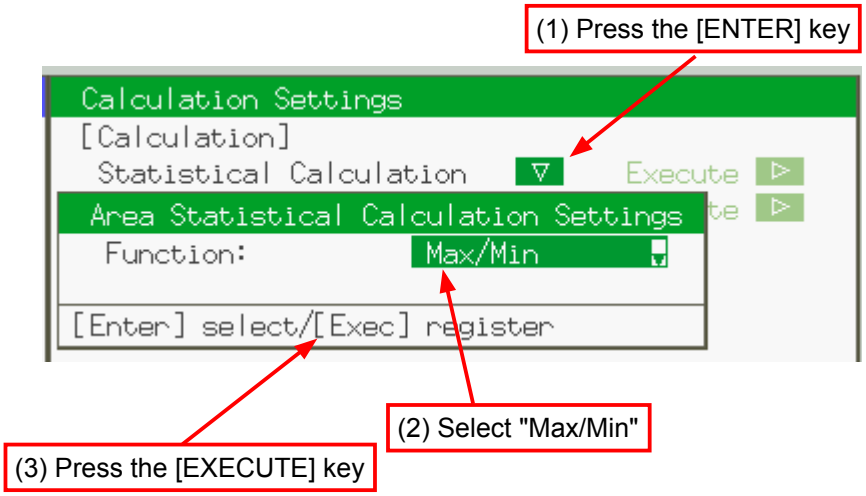
Note : Two cursors are displayed.

(6) Press the [MENU] key.

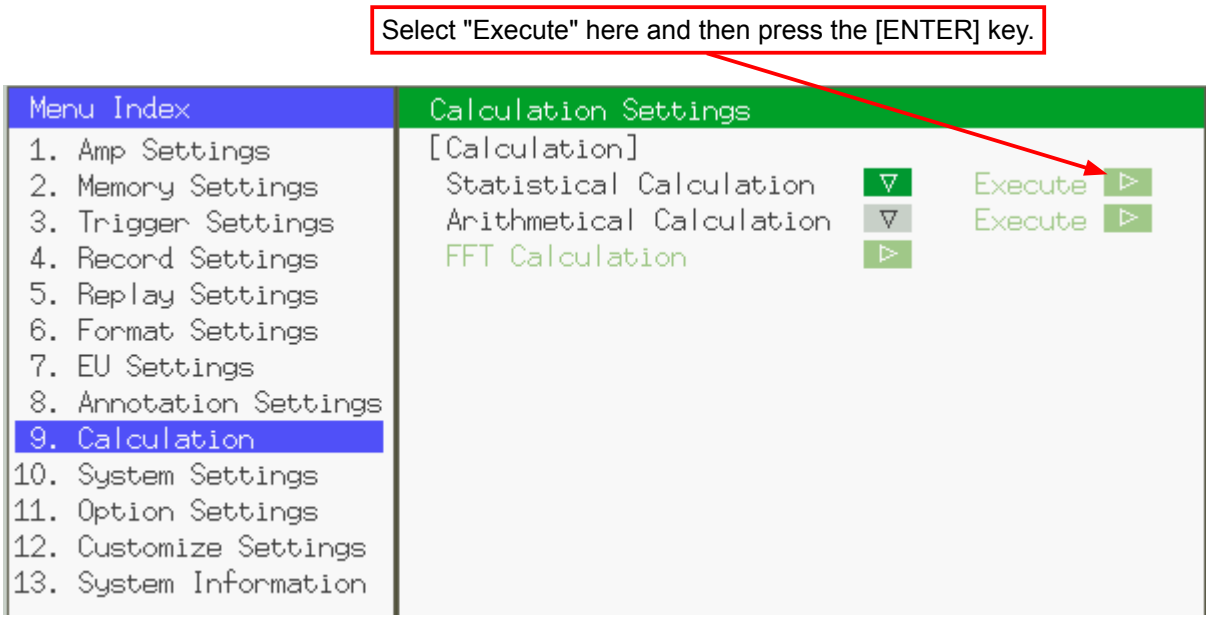
(7) Press the [DOWN POSITION] key until the "Calculation Settings" window as shown below appears, and then make the following settings.



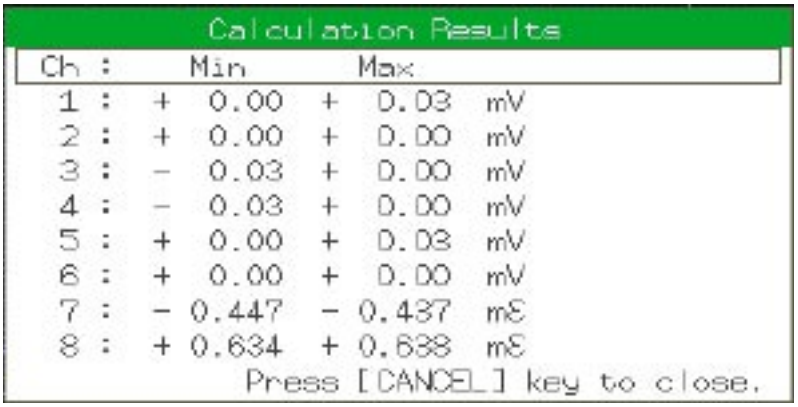
Function : Max/Min



(8) Select "Execute" and then press the [ENTER] key to start calculation.



(9) The following Max/Min values window is displayed.
Confirm that the values are within the ratings.


Calculation Results
Ch : Min Max
1 : + 0.00 + 0.03 mV
2 : + 0.00 + 0.00 mV
3 : - 0.03 + 0.00 mV
4 : - 0.03 + 0.00 mV
5 : + 0.00 + 0.03 mV
6 : + 0.00 + 0.00 mV
7 : - 0.447 - 0.437 mε
8 : + 0.634 + 0.638 mε
Press [CANCEL] key to close.

Note : Press the [Mode] key to change the measurement range.

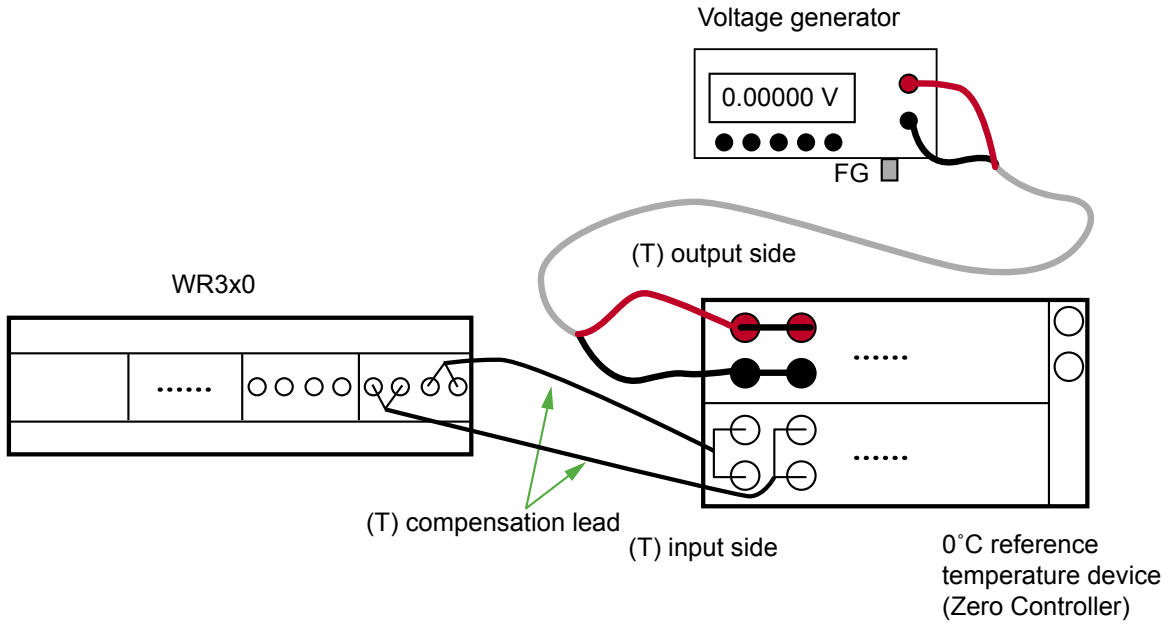
5.2.2 Temperature Accuracy

This inspection is only performed for M type amps.

Preparation

- Use (T) temperature compensation leads to connect the target amp and a 0˚C reference temperature device (zero controller) as shown below.
- As shown below, use copper leads to connect the 0˚C reference temperature device (zero controller) to a voltage generator that can specify output up to 1μV.

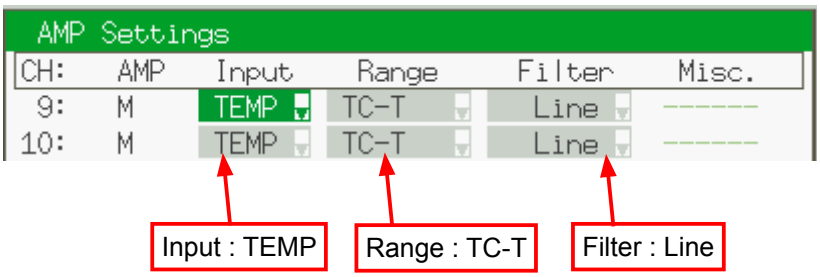
Wiring connection



Note : The compensation leads should be connected individually. Do not connect in parallel. Mutually connect the ground terminals of the voltage generator and the WR3x0.

Setting procedure

(1) Press the [MENU] key to display the "AMP settings" window as shown below, and then make the following settings.



Input : TEMP
Range : TC-T
Filter : Line

Measurement procedure for the M amp (temperature accuracy)

(1) Set the measurement conditions as described above.

(2) Connect the target amps to the zero controller with the (T) compensation leads. (Connect each channel individually)

(3) Use the voltage generator to successively input the reference voltage signal for each range to the 0˚C reference temperature device (zero controller) according to the table below, then check that the level of measurement is within the rating.

M amp : Input voltage precision ratings (Type T)		
Temperature	Input voltage	Standard
0 ˚C	0.000 mV	-2.5 ˚C to +2.5 ˚C
100 ˚C	4.279 mV	97.2 ˚C to 102.7 ˚C
200 ˚C	9.288 mV	197.1 ˚C to 202.9 ˚C
300 ˚C	14.862 mV	296.9 ˚C to 303.1 ˚C
390 ˚C	20.255 mV	386.7 ˚C to 393.3 ˚C
-100 ˚C	-3.379 mV	-103.3 ˚C to -96.7 ˚C
-200 ˚C	-5.603 mV	-204.1 ˚C to -195.9 ˚C

(4) Connect (K) compensation leads to each amp.

(5) Input the reference voltage signal for each range to the 0˚C reference temperature device (zero controller) according to the table below, then check that the level of measurement is within the rating.

M amp : Input voltage precision ratings (Type K)		
Temperature	Input voltage	Standard
0 ˚C	0.000 mV	-3 ˚C to +3 ˚C
1200 ˚C	48.838 mV	1194.6 ˚C to 1205.4 ˚C
-190 ˚C	-5.730 mV	-185.1 ˚C to -194.9 ˚C

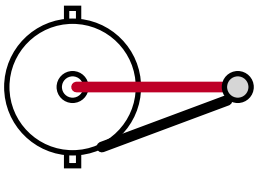
Note : If the above measurement is performed in the same measurement environment as the setup environment, the measurement results must be within the above "Standard".

5.3 Signal-to-Noise Ratio

Preparation

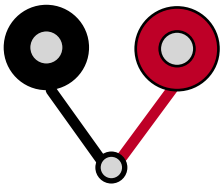
Prepare the short terminals shown below for shorting the + and - terminals for each channel of the target amp, and then short those terminals.

V amp



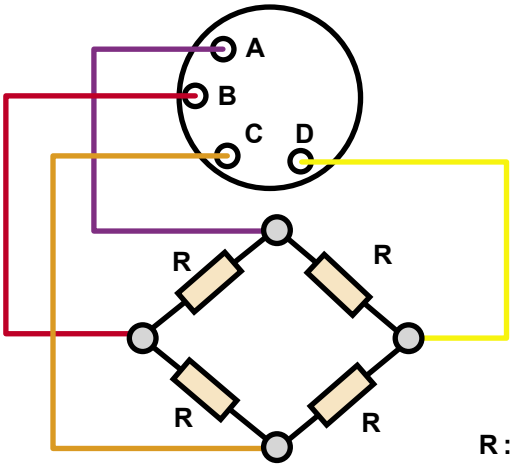
Make a short circuit between the "+" and "-" terminals.

M amp



Make a short circuit between the "+" and "-" terminals.

DCB amp



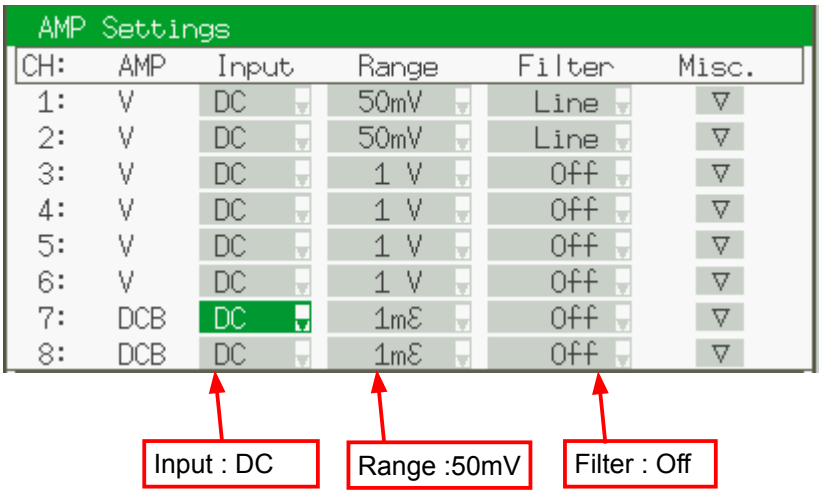
R : 350 Ω

Note :The F/V amp does not require this test.

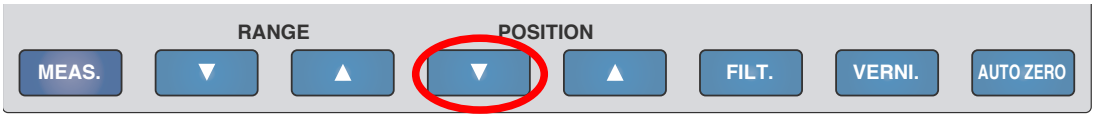
Setting Procedure

(1) Press the [MENU] key to display the "AMP Settings" window as shown below, and then make the following settings.

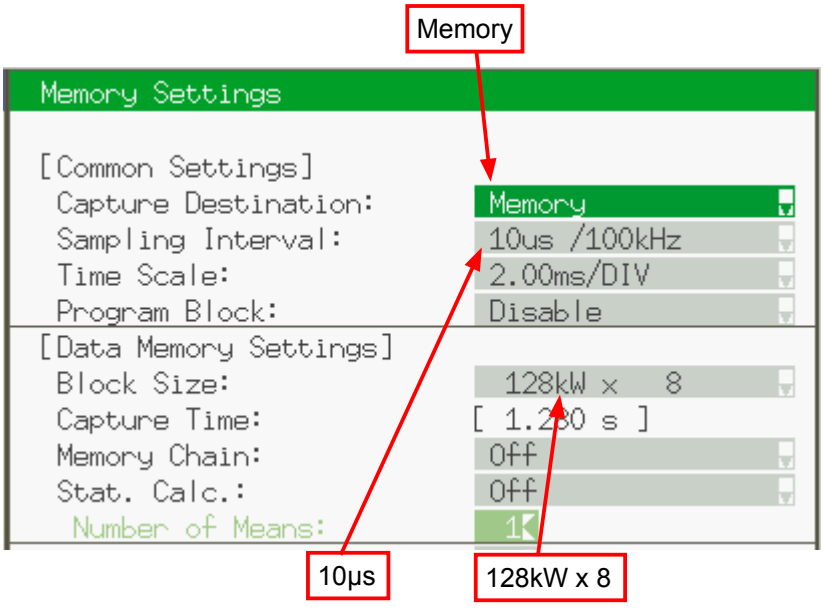
Input : DC
Range : 50 mV
Filter : Off


AMP Settings
CH: AMP Input Range Filter Misc.
1: V DC 50mV Line
2: V DC 50mV Line
3: V DC 1 V Off
4: V DC 1 V Off
5: V DC 1 V Off
6: V DC 1 V Off
7: DCB DC 1mE Off
8: DCB DC 1mE Off
Input : DC
Range :50mV
Filter : Off

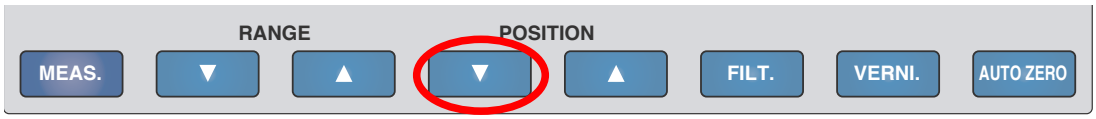
(2) Press the [DOWN POSITION] key to display the "Memory Settings" menu shown below, and then make the following settings.



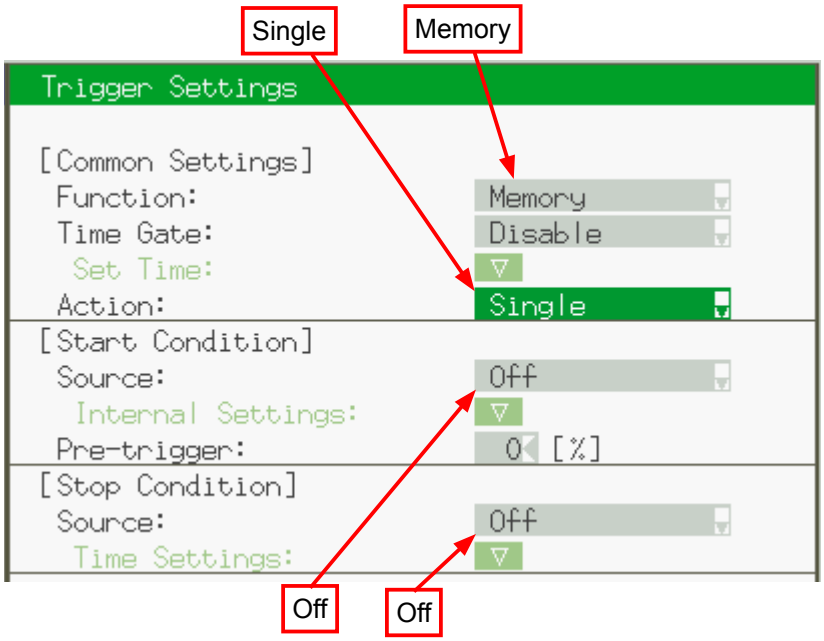
Capture Destination : Memory
Sampling Interval : 10 µs
Block Size : 128 KW x 8



(3) Press the [DOWN POSITION] key to display the "Trigger Settings" window as shown below, and then make the following settings.

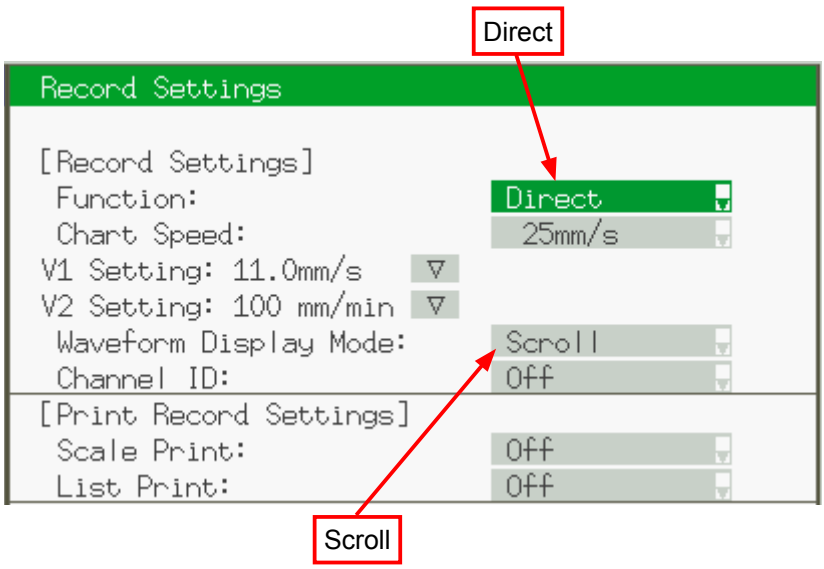


Function : Memory
Action : Single
Start Condition Source : Off
Stop Condition Source : Off



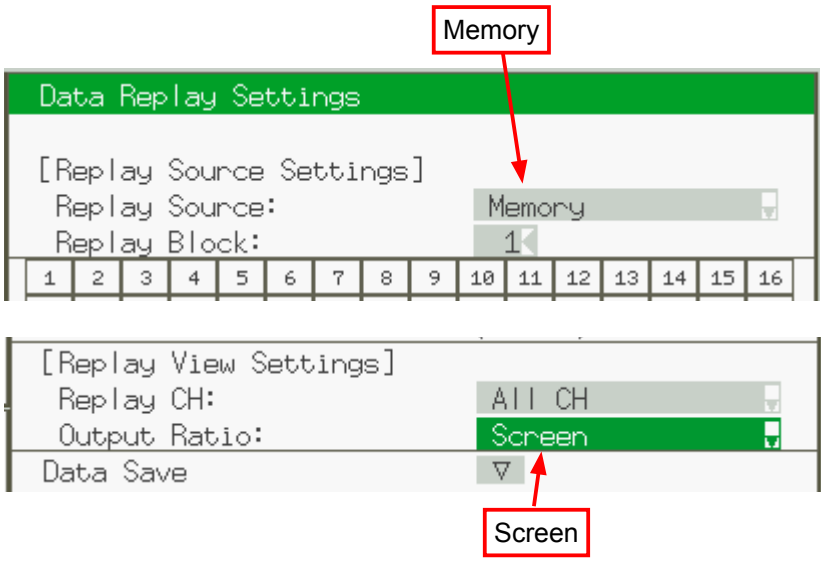
(4) Press the [DOWN POSITION] key to display the "Record Settings" window as shown below, and then make the following settings.

Function : Direct
Waveform Display Mode : Scroll



(5) Press the [DOWN POSITION] key to display the "Data Replay Settings" window as shown below, and then make the following settings.

Replay Source : Memory
Output Ratio : Screen



(6) Press the [START/STOP] key and then wait until the "Finished" message is displayed.

(7) Press the [START/STOP] key to stop measurement.

(8) Press the [REPLAY] key to display the waveform.

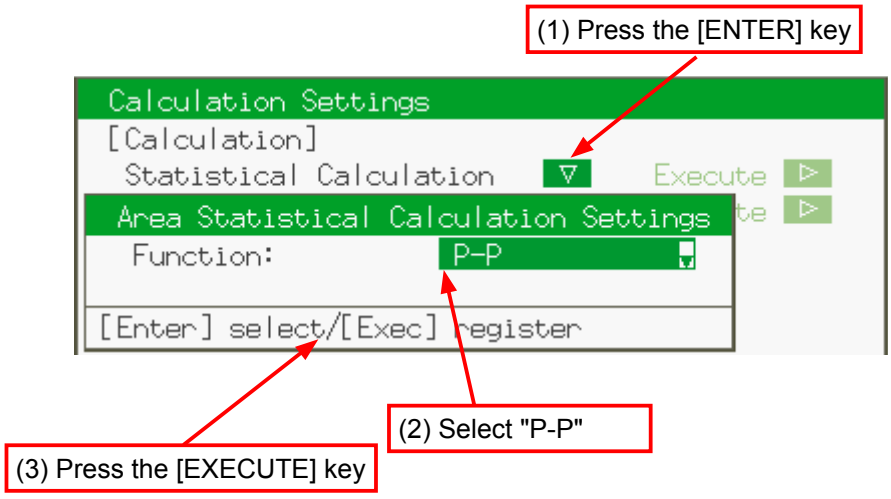
(9) Press the [CURSOR] key twice to display the two cursors.

Note : Two cursors are displayed.

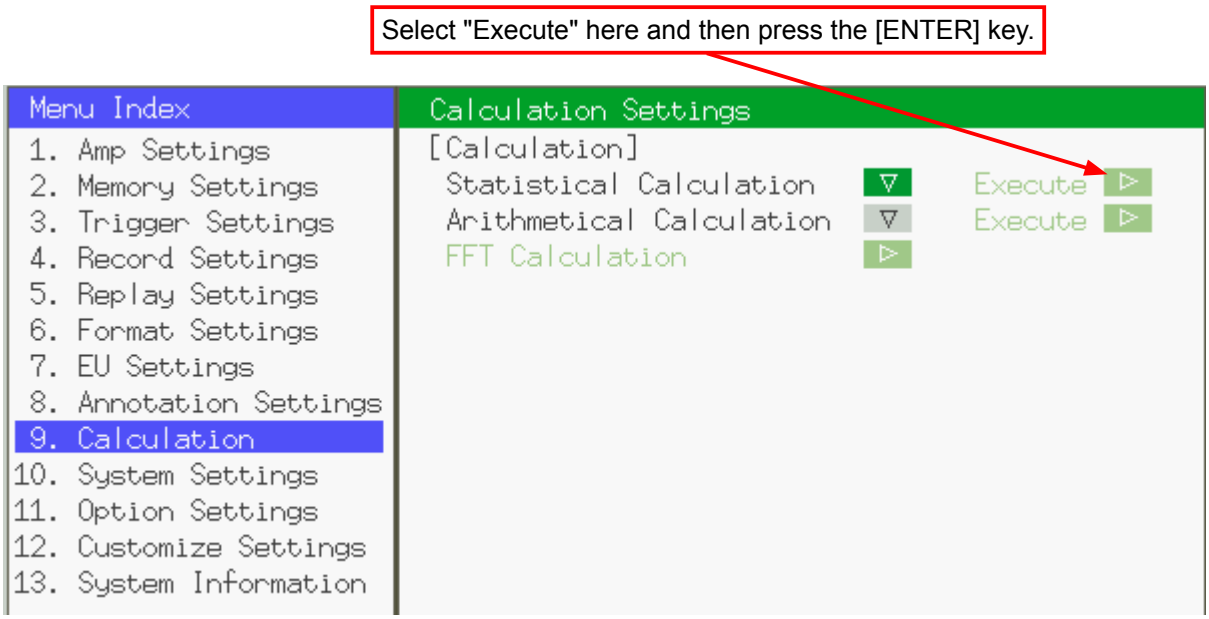
(10) Press the [MENU] key.

(11) Press the [DOWN POSITION] key until the "Calculation Settings" window as shown below appears, and then make the following settings.

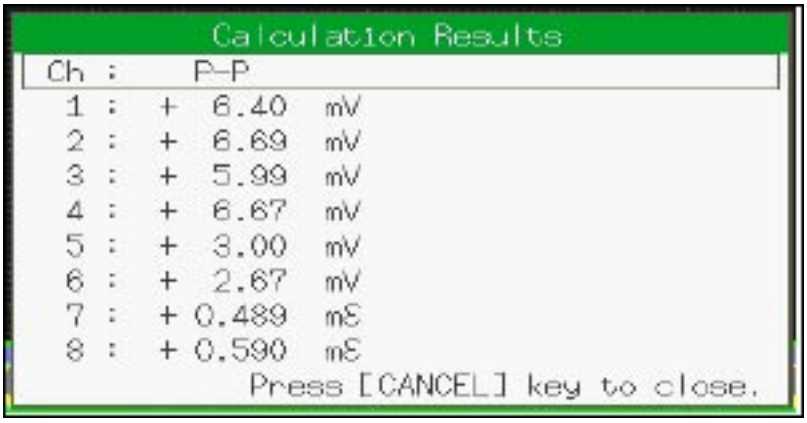
Function : P-P



(12) Select "Execute" and then press the [ENTER] key to start calculation.



(13) The following P-P values window is displayed.
Confirm that the values are within the ratings.



Note : Press the [Mode] key to change the measurement range.

Measurement

(1) Use the short terminals to short the input terminals of all the channels.

(2) Use the voltage generator to successively input the reference voltage signal for each range according to the table below, then check that the level of measurement is within the rating.

Input voltage precision ratings		
Amp	Range	Measurement Range
V-AMP	50 mV	-0.25 mV to +0.25 mV
	5 V	-0.25 V to +0.25 V
M-AMP	20 mV	-0.1 mV to +0.1 mV
	2 V	-0.01 V to +0.01 V
DCB-AMP	1 m strain	-0.05 m strain to +0.05 m strain

Note : Press the [SHIFT] key and then press the [REPLAY/EXIT] key to change the measurement range.

Before starting measurement, perform "Auto balance" when checking the DCB-AMP.
The checking procedure is described in "Measurement Accuracy".

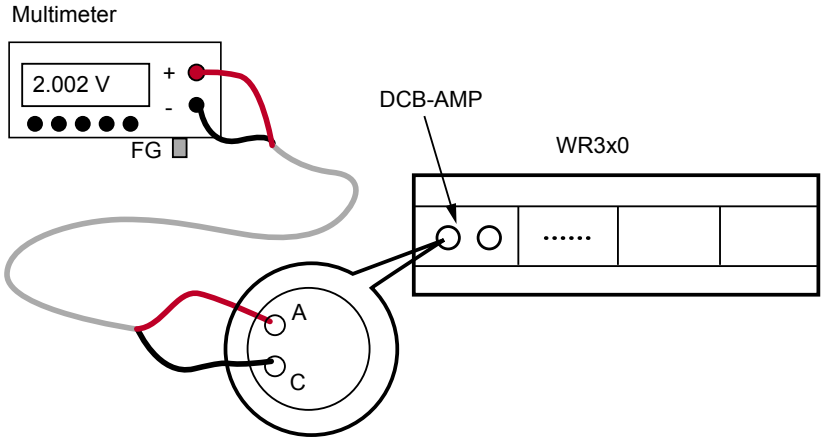
5.4 DC Bridge Voltage Measurement

Preparation

• Use a multimeter (using four-digit settings).

Wiring Connection

Connect the multimeter to the DCB amp input terminal as shown below.



Measurement

(1) Check that the measurement voltage is within +2.003 V to -1.977 V.
(Manufacturing specification : 2 V ±0.15%)

5.5 Frequency and Filter Characteristics

Preparation

• Have on hand an oscillator capable of the types of output described below.
  Output waveforms : sine waves
  Frequency : 1.0 Hz to 10 MHz
• Mutually connect the GND terminals of the oscillator and FG terminal of the WR3x0 before measurement.

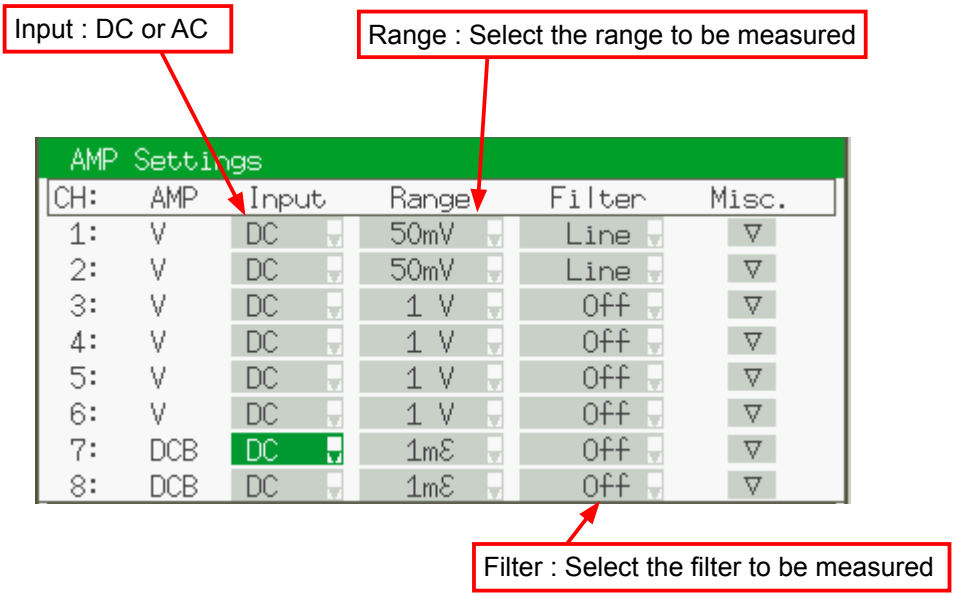
Wiring Connection

Connect the oscillator to each amp input terminal.

Setting Procedure

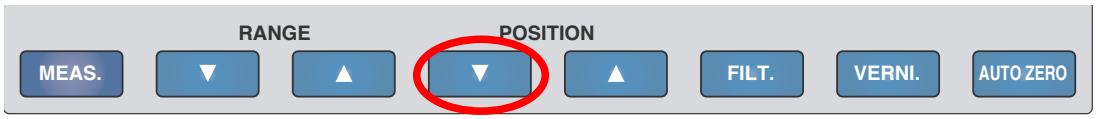
(1) Press the [MENU] key to display the "AMP Settings" window as shown below, and then make the following settings.
  AMP : V, M, DCB, F/V (select the measuring amp)
  Input : DC or AC (depends on the input frequency)
  Range : Select the range to be measured
  Filter : Select the filter to be measured

Amp	Range	Span	Input signal
V-amp	5 V	-2.500 to +2.500 V	5 V p-p
M-amp	2 V	-1.0000 to +1.0000 V	2 V p-p
DCB-amp	20 m strain	-10.000 to +10.000 m strain	20 mV p-p

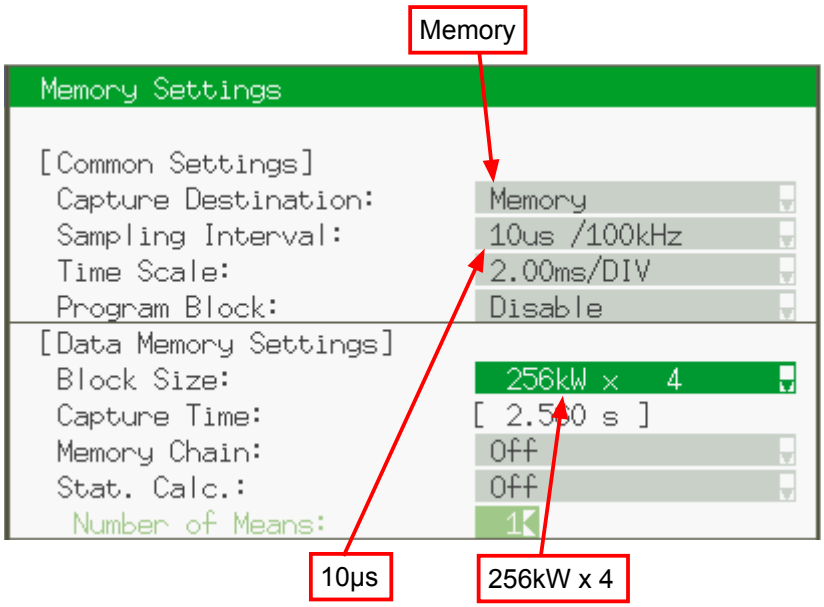

Input : DC or AC
Range : Select the range to be measured
AMP Settings
CH: AMP Input Range Filter Misc.
1: V DC 50mV Line
2: V DC 50mV Line
3: V DC 1 V Off
4: V DC 1 V Off
5: V DC 1 V Off
6: V DC 1 V Off
7: DCB DC 1mε Off
8: DCB DC 1mε Off
Filter : Select the filter to be measured

(2) Press the [DOWN POSITION] key to display the "Memory Settings" menu shown below, and then make

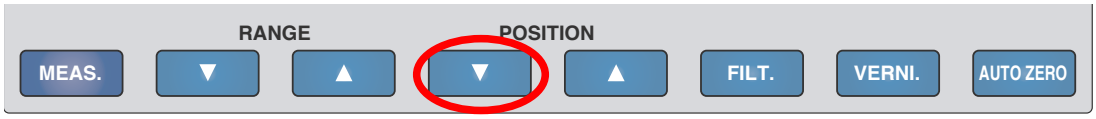
the following settings.



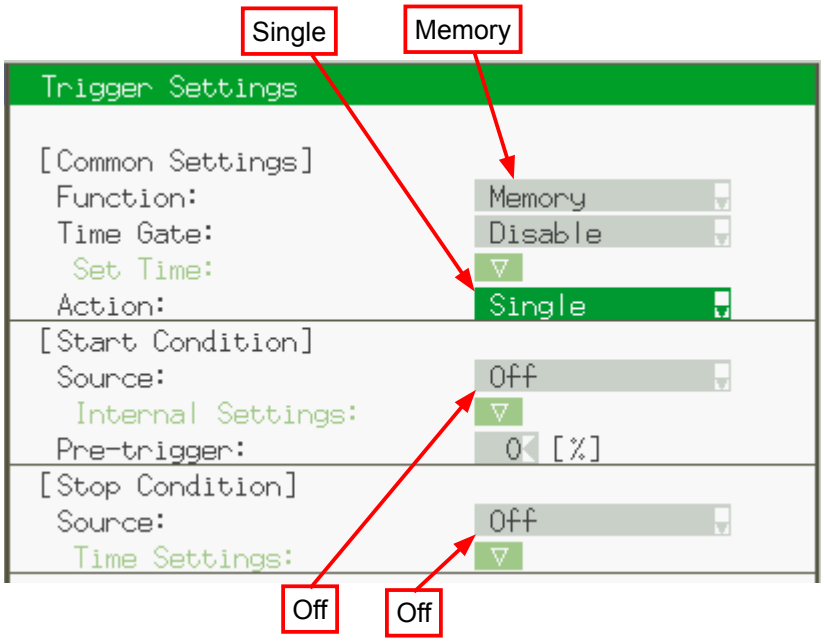
Capture Destination : Memory
Sampling Interval : 10 µs
Block Size : 256 KW x 4



(3) Press the [DOWN POSITION] key to display the "Trigger Settings" window as shown below, and then make the following settings.

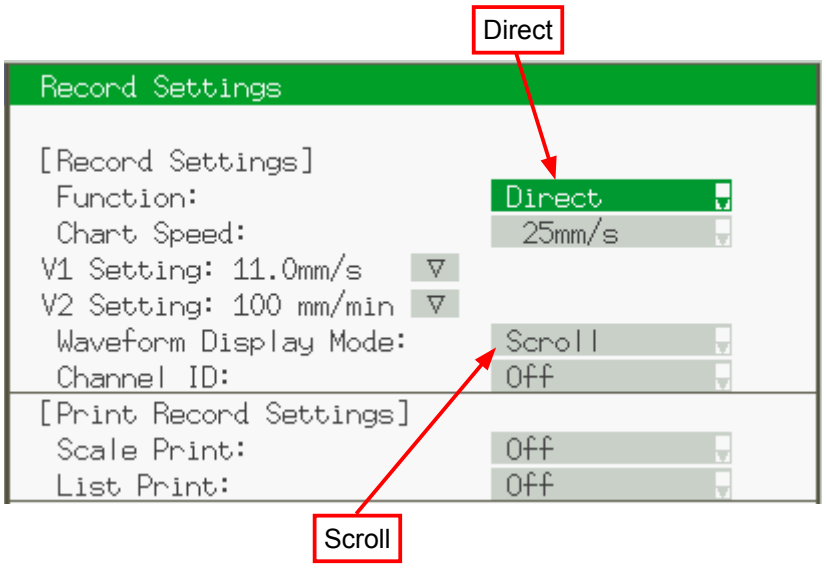


Function : Memory
Action : Single
Start Condition Source : Off
Stop Condition Source : Off



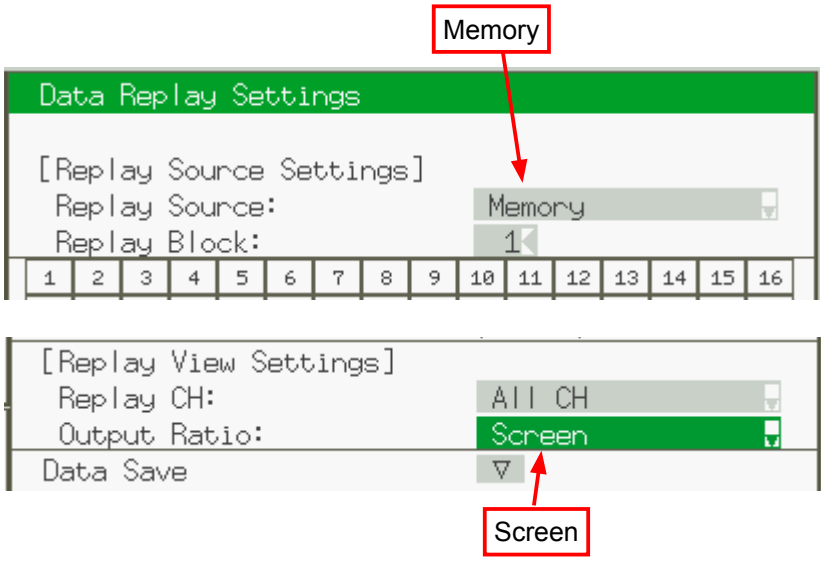
(4) Press the [DOWN POSITION] key to display the "Record Settings" window as shown below, and then make the following settings.

Function : Direct
Waveform Display Mode : Scroll



(5) Press the [DOWN POSITION] key to display the "Data Replay Settings" window as shown below, and then make the following settings.

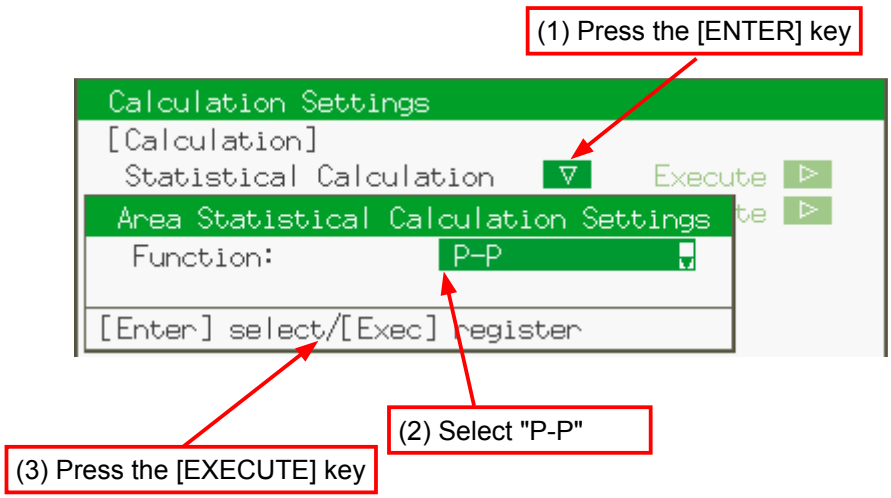
Replay Source : Memory
Output Ratio : Screen



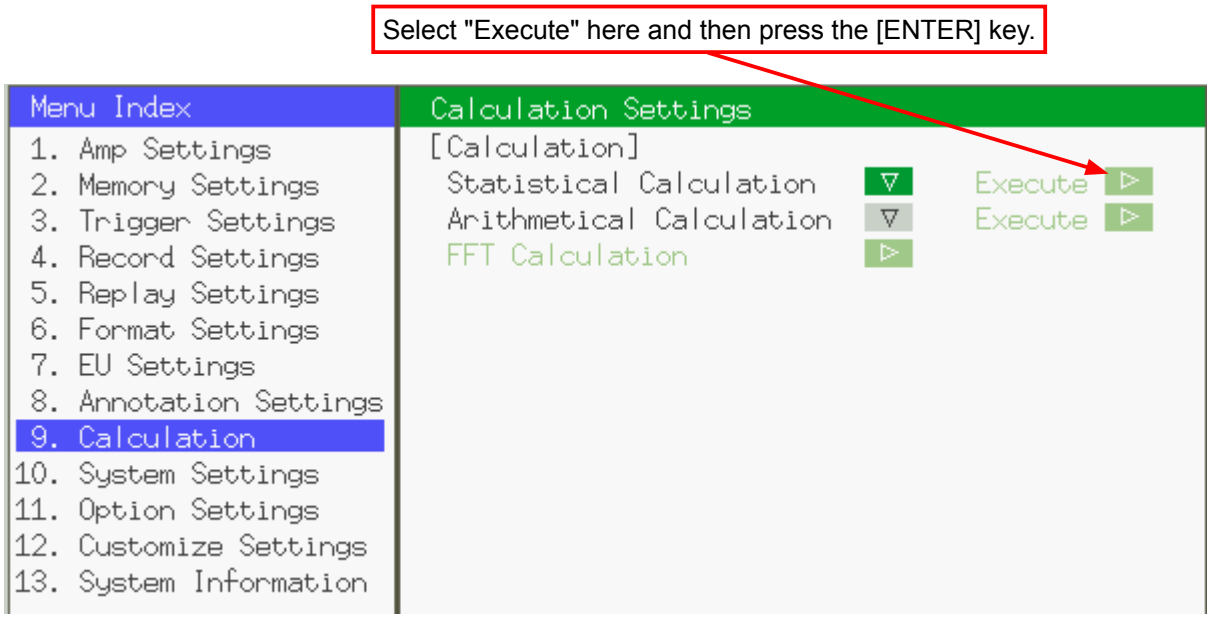
(6) Press the [START/STOP] key and then wait until the "Finished" message is displayed.
(7) Press the [START/STOP] key to stop measurement.
(8) Press the [REPLAY] key to display the waveform.
(9) Press the [CURSOR] key twice to display the two cursors.
Note : Two cursors are displayed.
(10) Press the [MENU] key.

(11) Press the [DOWN POSITION] key until the "Calculation Settings" window as shown below appears, and then make the following settings.

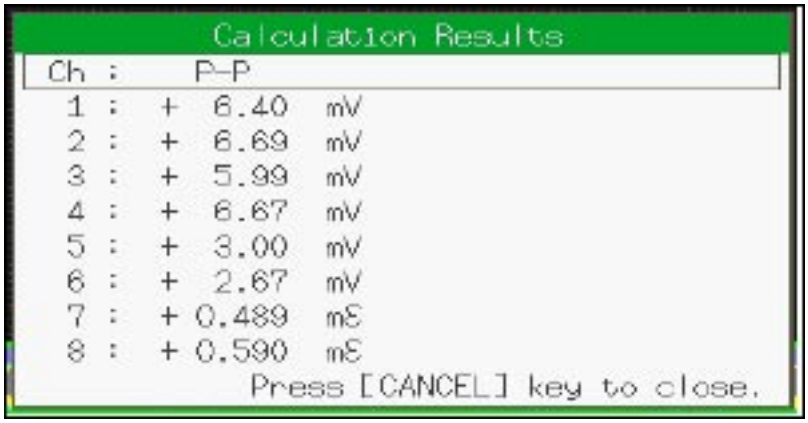
Function : P-P



(12) Select "Execute" and then press the [ENTER] key to start calculation.



(13) The following P-P values window is displayed.
Confirm that the values are within the ratings.



Note : Press the [Mode] key to change the measurement range.

Measurement procedure

(1) Input the reference signal for each amp according to the table below, and then check that the measured amplitude is within the rating when compared with the amplitude during reference signal input.

V amp

Amp settings				Generator output settings			Rating	
Input	Range	Filter	Span	Frequency	AMPTD	FCTN	Rating (%)	Rating (5 V input)
DC	5 V	Line	-2.500 to +2.500 V	1.5 Hz	5 V p-p	Sine wave	55% to 85%	2.75 V to 4.25 V
		5 Hz		5 Hz				
		10 Hz		10 Hz				
		50 Hz		50 Hz			60% to 80%	3 V to 4 V
		500 Hz		500 Hz				
		5 kHz		5 kHz				
		50 kHz		50 kHz				
		OFF		200 kHz			70% to 112%	3.5 V to 5.6 V
AC		OFF		10 Hz			60% to 80%	3 V to 4 V

M amp

Amp settings				Generator output settings			Rating	
Input	Range	Filter	Span	Frequency	AMPTD	FCTN	Rating (%)	Rating (2 V input)
DC	2 V	Line	-1.0000 to +1.0000 V	1.5 Hz	2 V p-p	Sine wave	55% to 85%	1.1 V to 1.7 V
		5 Hz		5 Hz				
		10 Hz		10 Hz				
		30 Hz		30 Hz			60% to 80%	1.2 V to 1.6 V
		50 Hz		50 Hz				
		500 Hz		500 Hz				
		5 kHz		5 kHz				
		OFF		20 kHz			65% to 112%	1.3 V to 2.24 V
AC		OFF		10 Hz			60% to 80%	1.2 V to 1.6 V

DCB amp

Amp settings				Generator output settings			Rating	
Input	Range	Filter	Span	Frequency	AMPTD	FCTN	Rating (%)	Rating (20 m input)
DC	20 m strain	Line	-10.000 to +10.000 m strain	1.5 Hz	20 mV p-p	Sine wave	55% to 85%	11 m to 17 m strain
		10 Hz		10 Hz			60% to 80%	12 m to 16 m strain
		30 Hz		30 Hz				
		100 Hz		100 Hz				
		300 Hz		300 Hz				
		1 kHz		1 kHz				
		OFF		20 Hz			70% to 112%	14 m to 22.4 m strain

Note: 10 MHz frequency when the filter is off

When you connect the cables to each amp in parallel, the cable resistance and the input resistance of each amp will cause a decrease in amplitude.

(2) Press the [START/STOP] key and then wait until the "Finished" message is displayed.

(3) Press the [START/STOP] key to stop measurement.

(4) Press the [REPLAY] key to display the waveform.

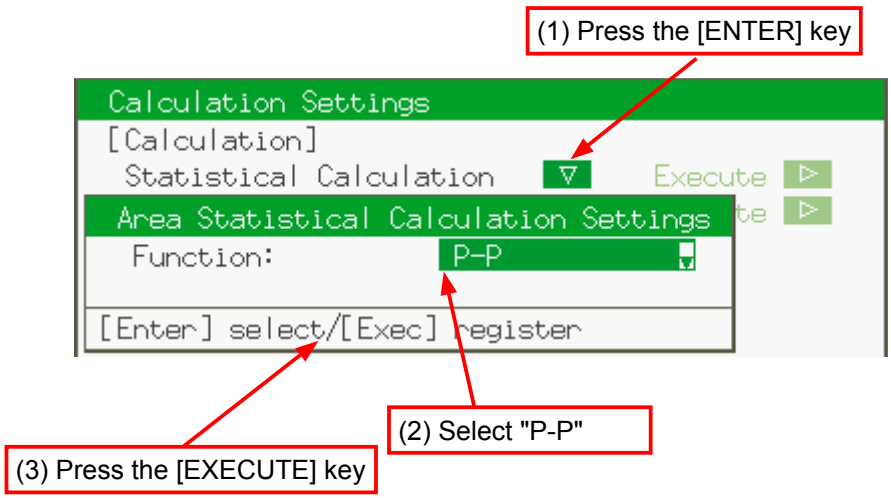
(5) Press the [CURSOR] key twice to display the two cursors.

Note : Two cursors are displayed.

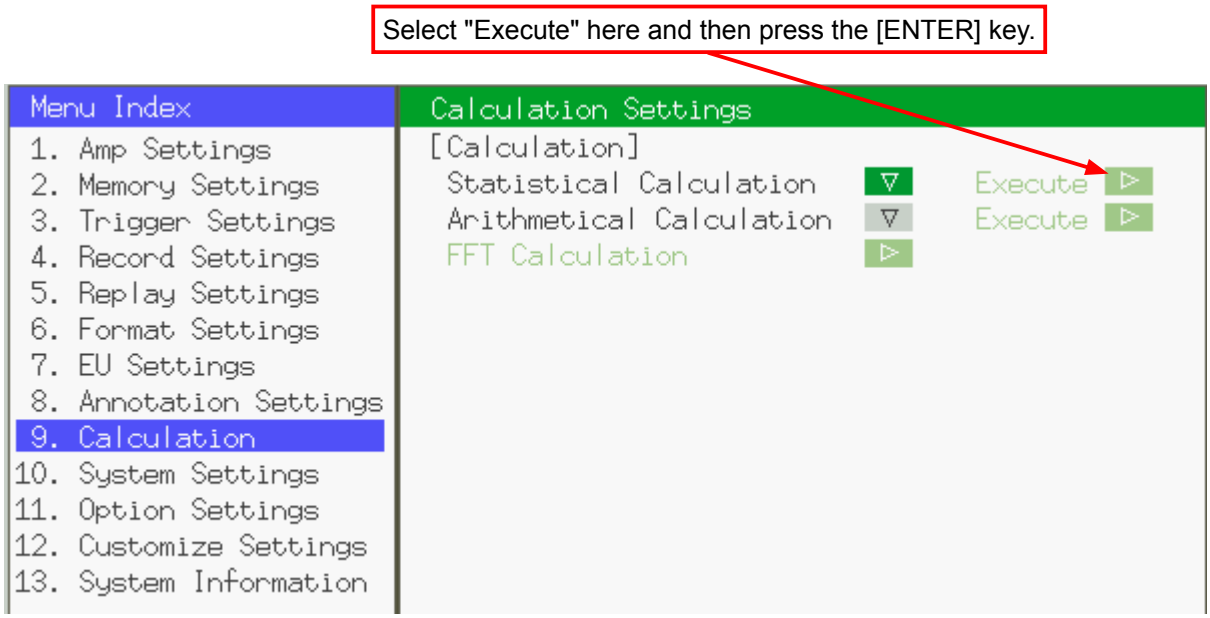
(6) Press the [MENU] key.

(7) Press the [DOWN POSITION] key until the "Calculation Settings" window as shown below appears, and then make the following settings.

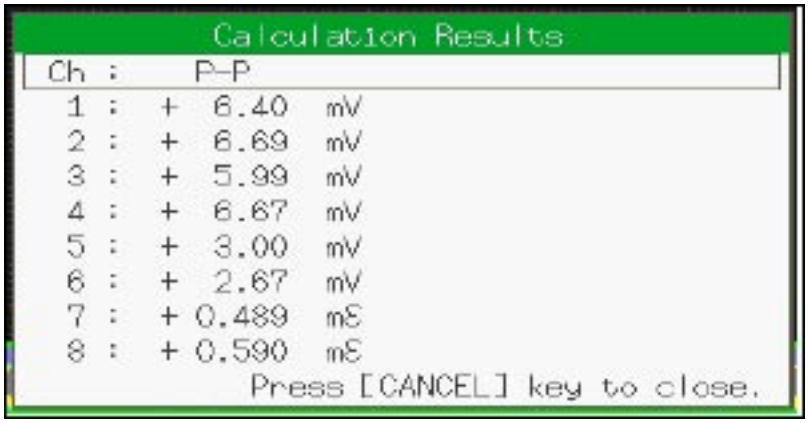
Function : P-P



(8) Select "Execute" and then press the [ENTER] key to start calculation.



(9) The following P-P values window is displayed.
Confirm that the values are within the ratings.



Note : Press the [Mode] key to change the measurement range.

5.6 Checking the F/V-Amp Input Change

Preparation

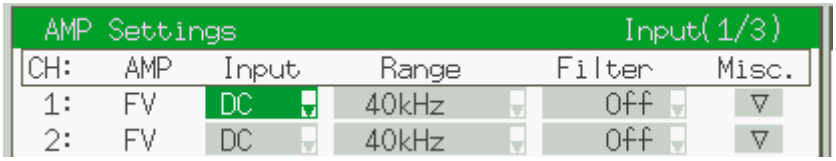
• Use a signal generator.

Wiring Connection

Connect the signal generator to the F/V-amp. Input a rectangular waveform to the F/V-amp.

Setting Procedure

(1) Press the [MENU] key to display the "AMP Settings" window as shown below, and then make the following settings.
Range : 40 kHz
Filter : Off



Checking Procedure

(1) Make the following settings.
Input : DC
Range : 40 kHz
Filter : Off
(2) Start the waveform measurement in the RECORDER mode.
(3) Input the reference signal for the F/V-amp as shown below.
Function generator output
AMPTD : ±1 V
FCTN : 20 kHz rectangular waveform (⎍)
(4) Measure the waveform in the RECORDER mode, and then check that the measured value is 20 kHz.
(5) Input the reference signal for the F/V-amp as shown below.
Function generator output
AMPTD : ±1.5 to 3.5 V (Offset : +2.5 V)
FCTN : 20 kHz rectangular waveform (⎍)
(6) Measure the waveform in the RECORDER mode, and then check that the measured value is 0 kHz.
(7) Press the [MENU] key to display the "AMP Settings" window, make the following settings, and then check that the measured value is 20 kHz.
Input : 0C
Range : 40 kHz
Filter : Off
(8) Measure the waveform in the RECORDER mode, and then check that the measured value is 20 kHz.

5.7 Checking the Logic Amp

Preparation

• Use a signal generator.

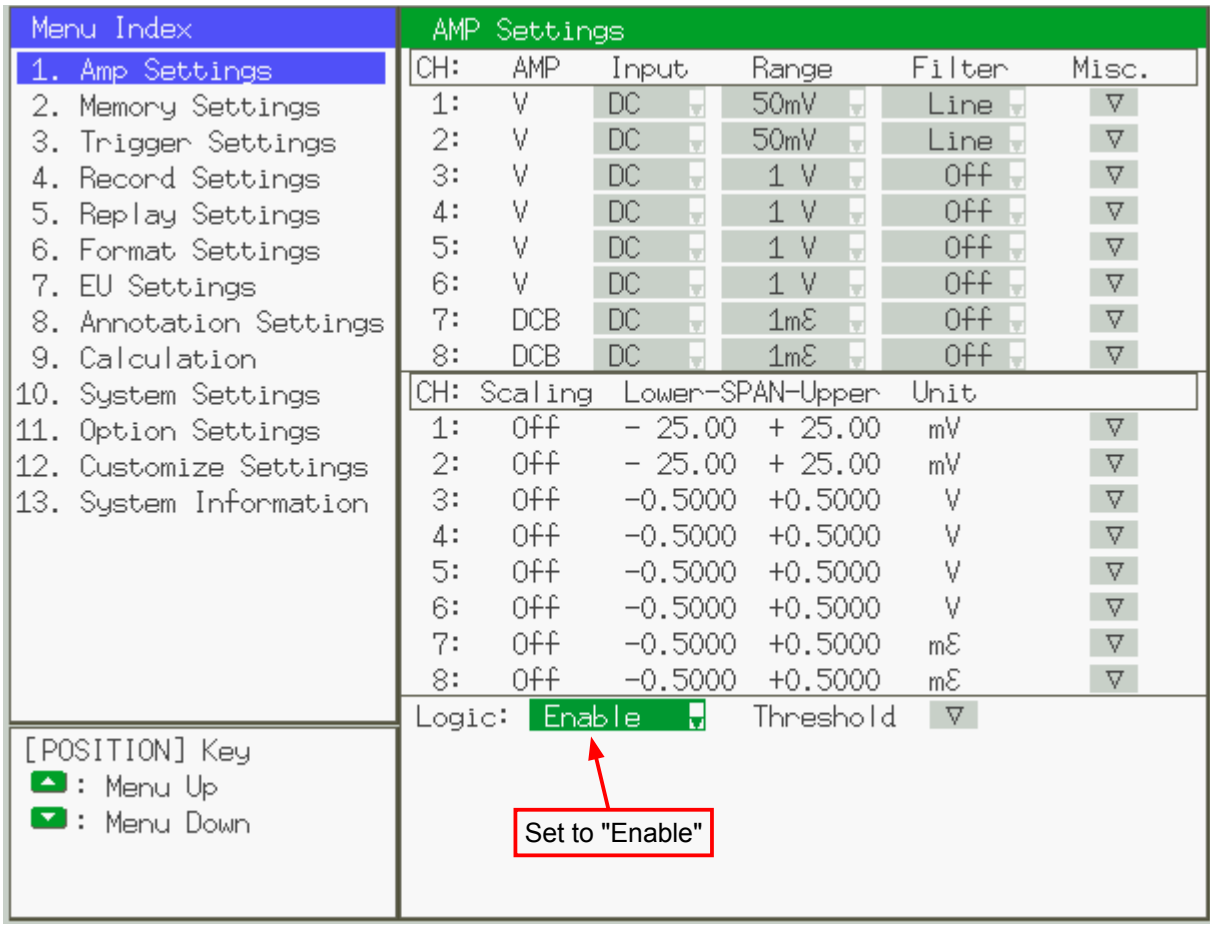
Wiring Connection

Connect the signal generator to the logic amp. Input a rectangular waveform to the logic amp.

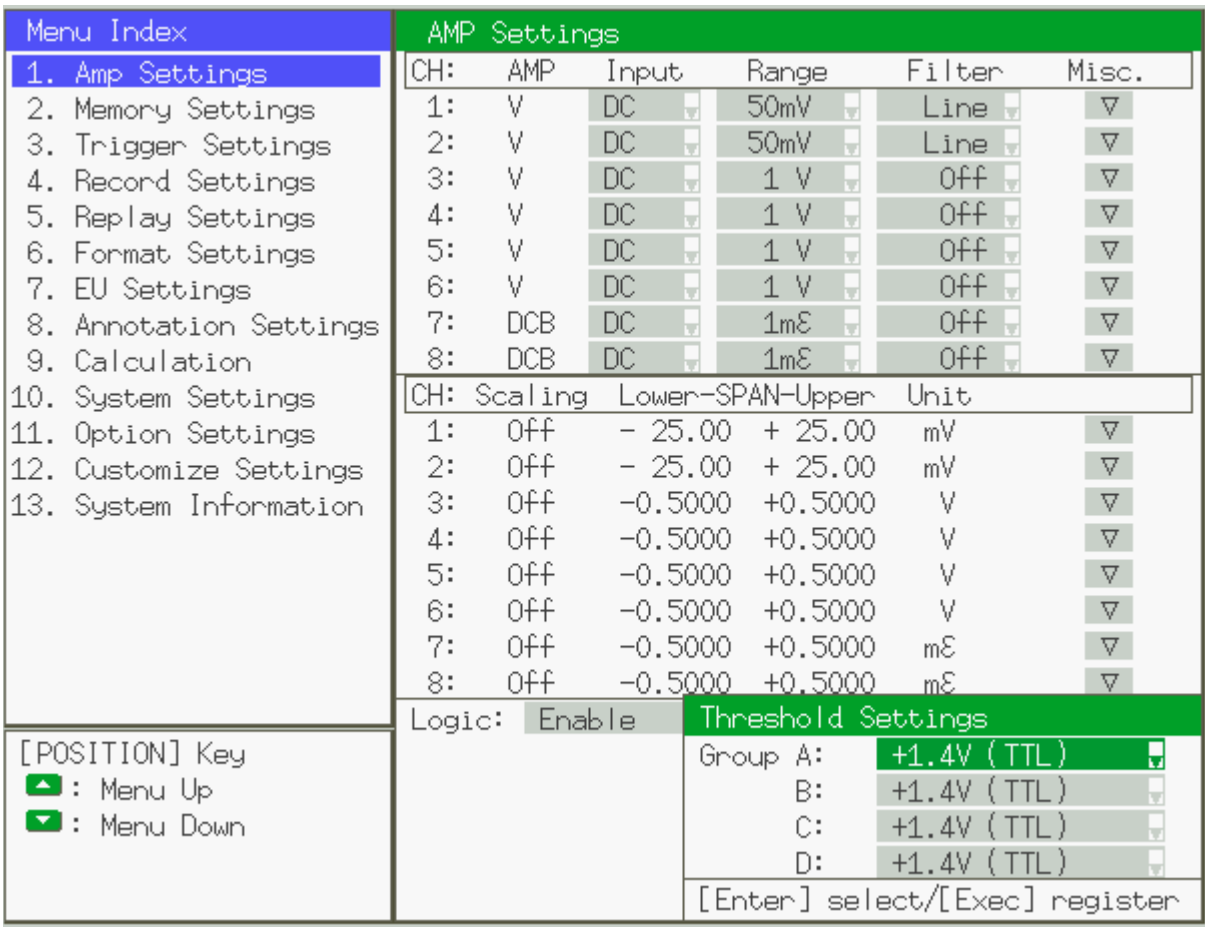
Setting Procedure

(1) Press the [MENU] key to display the "AMP Settings" window as shown below, and then make the following settings.

Logic : Enable

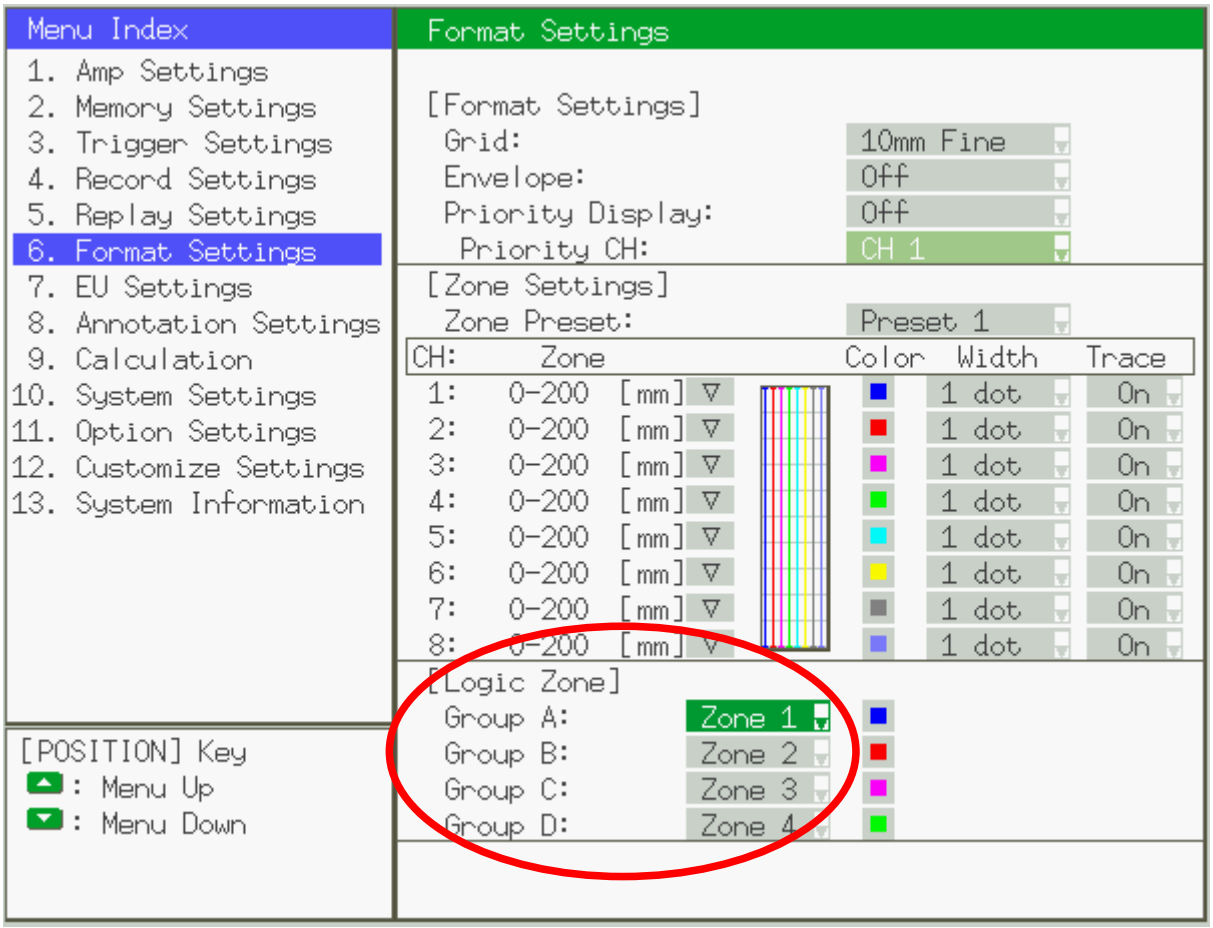


(2) Set the threshold level (check +1.4 V / +2.5 V / +5V).



(3) Press the [DOWN POSITION] key until the "Format Settings" window as shown below appears, then make the following settings.

Group A : Zone 1
Group B : Zone 2
Group C : Zone 3
Group D ; Zone 4
(C and D are for the 16-channel model only)



Points to check

(1) Set the threshold level to +1.4 V (TTL).
Input the signal to the logic amp.
Check the level of the signal.

Input Voltage	Level
1 V	L
2 V	H

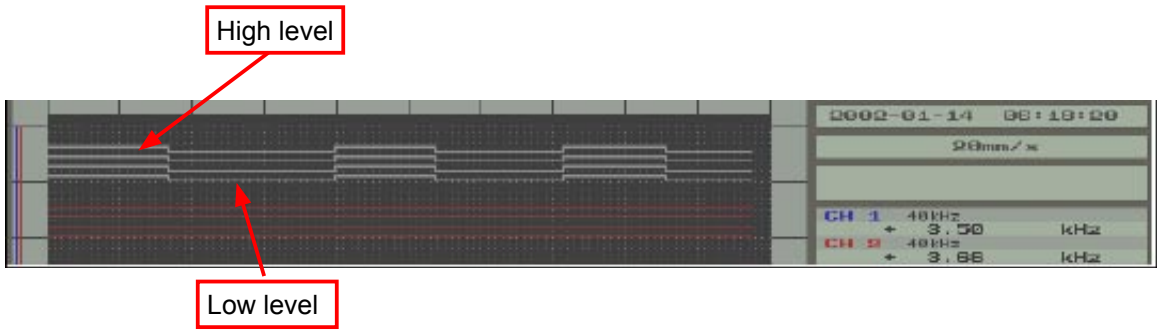
(2) Set the threshold level to +2.5 V (TTL).
Input the signal to the logic amp.
Check the level of the signal.

Input Voltage	Level
2 V	L
3 V	H

(3) Set the threshold level to +5.0 V (TTL).
Input the signal to the logic amp.
Check the level of the signal.

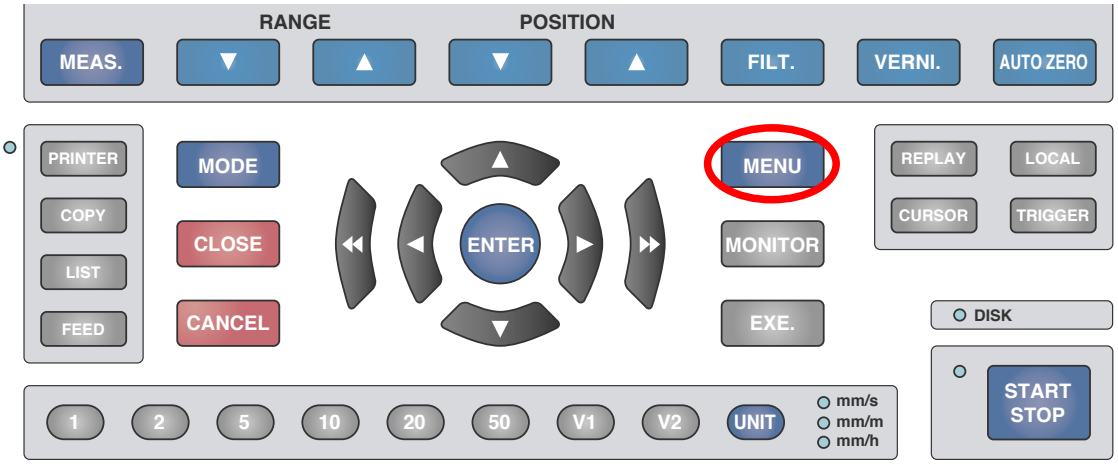
Input Voltage	Level
4 V	L
6 V	H

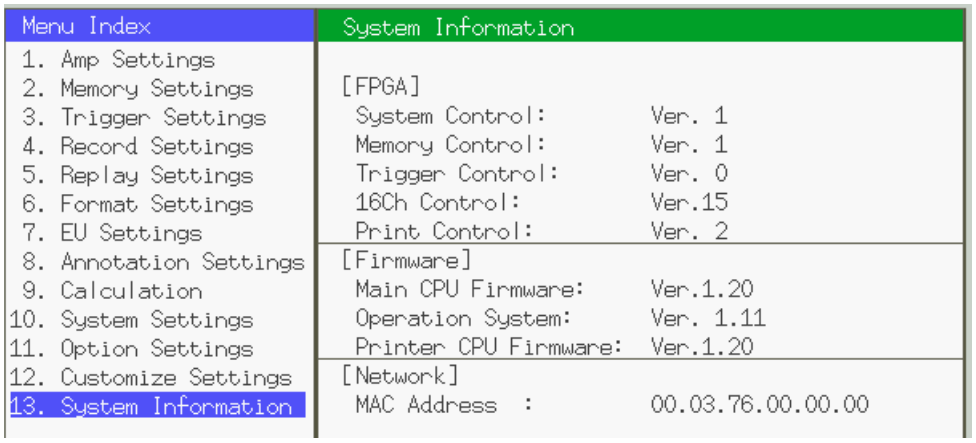
Note : All the above procedures should be performed using the same setting conditions for all groups.



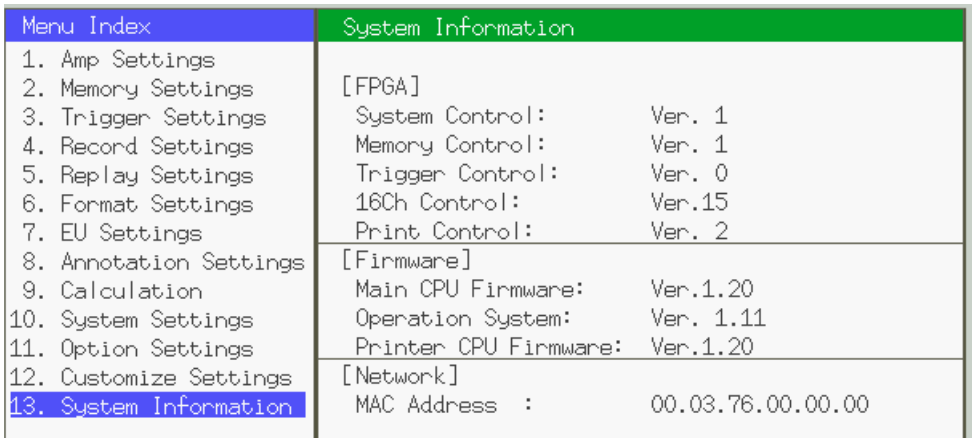
5.8 Checking the Control Panel Keys

(1) Press the [MENU] key to display the “Menu Index” menu shown below.

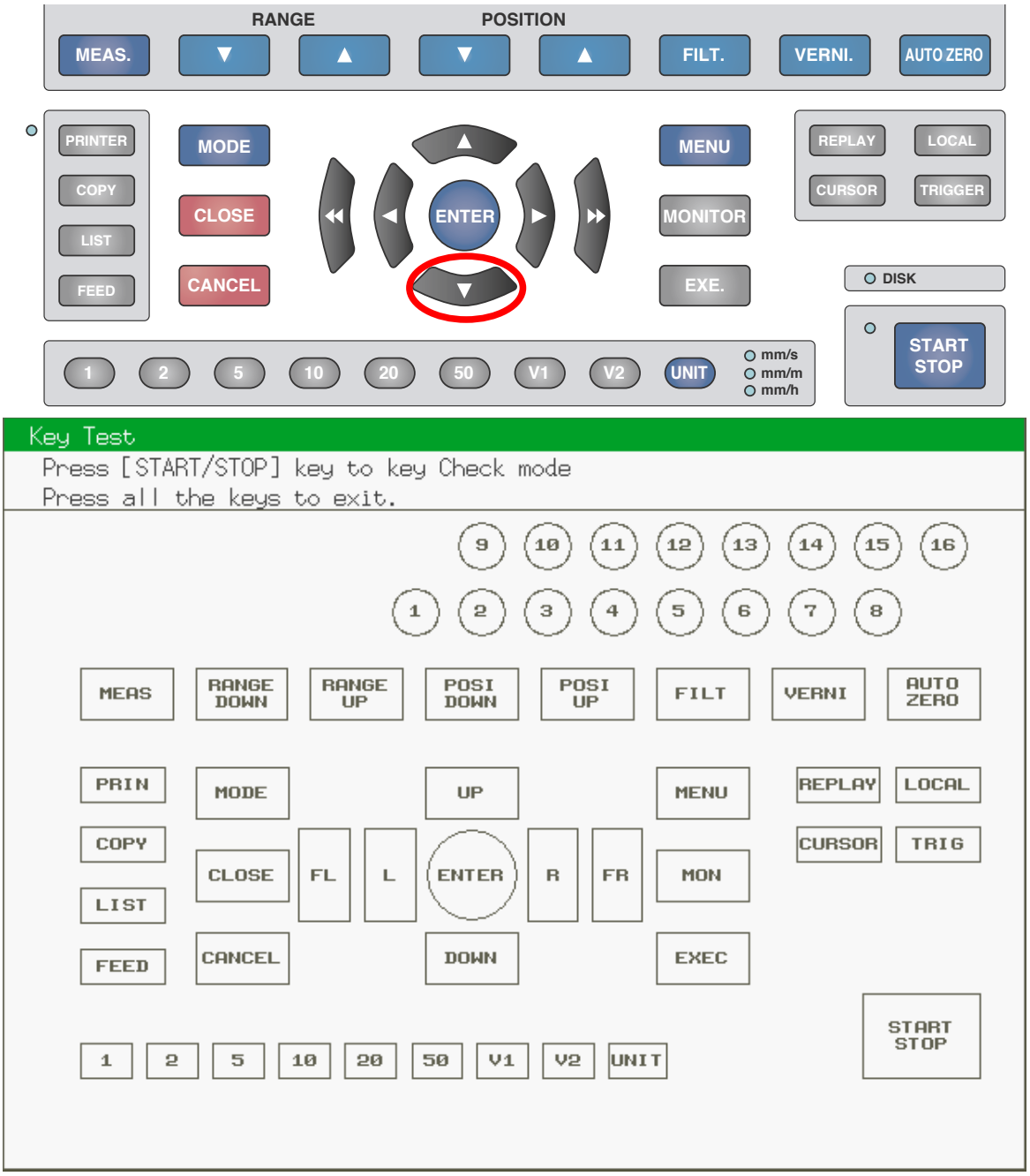




(2) Press the [UP POSITION] key to display the "System Information" menu shown below.



(3) Press the [DOWN DIRECTION] key ten times to display the "Key Test" menu shown below.



(4) Press the [START/STOP] key to start the test for the keys. Confirm the response of all the keys. This test will close when you have pressed all the keys.

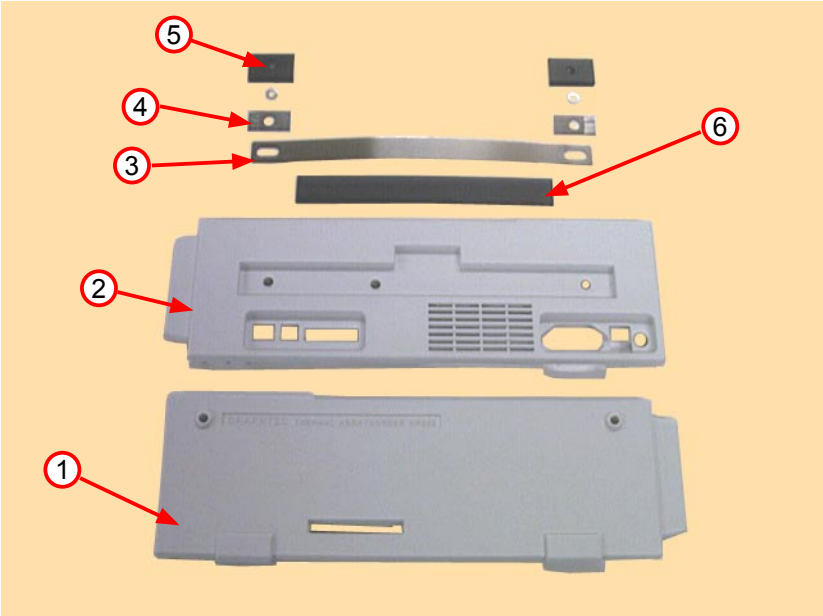
6. PARTS LISTS

6.1 RECOMMENDED PARTS LISTS

Part No.	Description	QTY	Remarks
790131700	Main Control Board	1	
790131702	AMP Mother Board	1	
770131131	System Power Board	1	
790131701	Control Key Board	1	
	16-ch Control Board	1	Only for 16-ch (WR3x0-16) models
770131101	Fan Motor	1	
	WR3-V AMP	1	Voltage Amp
	WR3-M AMP	1	Voltage / Temperature Amp
	WR3-FV AMP	1	Frequency Amp
	WR3-DCB AMP	1	Strain Amp
	LOGIC AMP	1	Logic Amp
500052364	Power Supply Unit, DFD24SX-U	1	Power supply for 4-ch model
500052367	Power Supply Unit, DFE24SX-U	1	Power supply for 16-ch and 8-ch models
500052365	100 mm Thermal Head	1	KPC-108-8TA01-STA
500002329	200 mm Thermal Head	1	KJT-216-8MGF1-GR, Uses the same part as the WR1000
770530103	AMP DC/DC1	1 or 2	4, 8-ch: 1, 16-ch: 2, Uses the same part as the DM3100
770530104	AMP DC/DC2	1 or 2	4, 8-ch: 1, 16-ch: 2, Uses the same part as the DM3100
500051411	LCD, AA084VC01	1	Uses the same part as the DM3100
790530705	DC-AC Inverter, S-12613-7M	1	Uses the same part as the DM3100
500051647	IC25N040ATMR04-0	1	HDD, Uses the same part as the DM3100
790530706	HDD Control Board	1	DM3000-08A ASSY, Uses the same part as the DM3100
790530707	HDD RELAY BOARD	1	DM3000-22A ASSY, Uses the same part as the DM3100

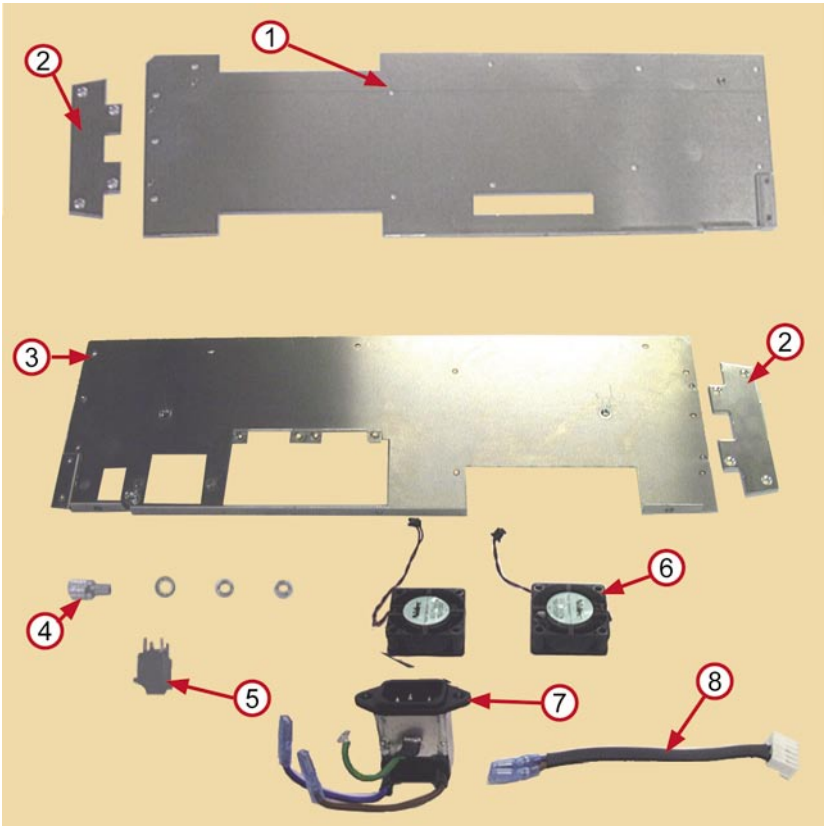
6.2 Parts Lists

6.2.1 Front & Rear Cover Parts



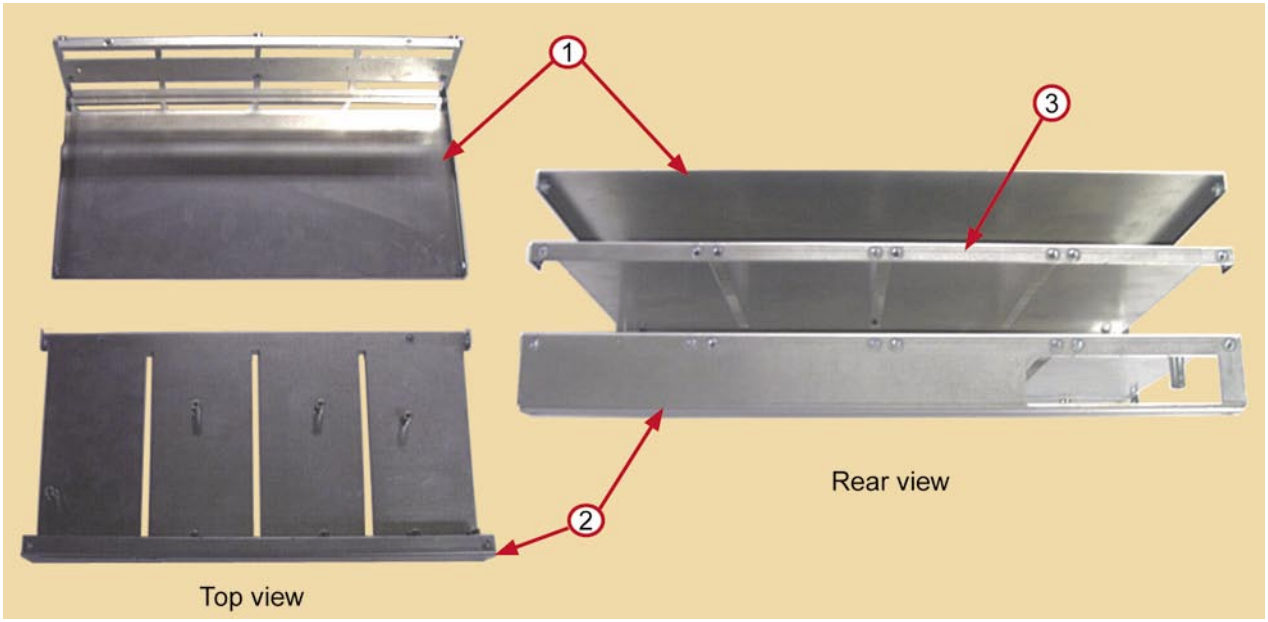
No.	Part No.	Description	QTY	Remarks
1	601310100	Front Cover	1	
2	601310110	Rear Cover	1	
3	076005030	Handle Plate	1	
4	076005040	Handle Bottom Plate	2	
5	601100290	Handle Cover	2	
6	076005030	Handle	1	

6.2.2 Front & Rear Side Plate Parts



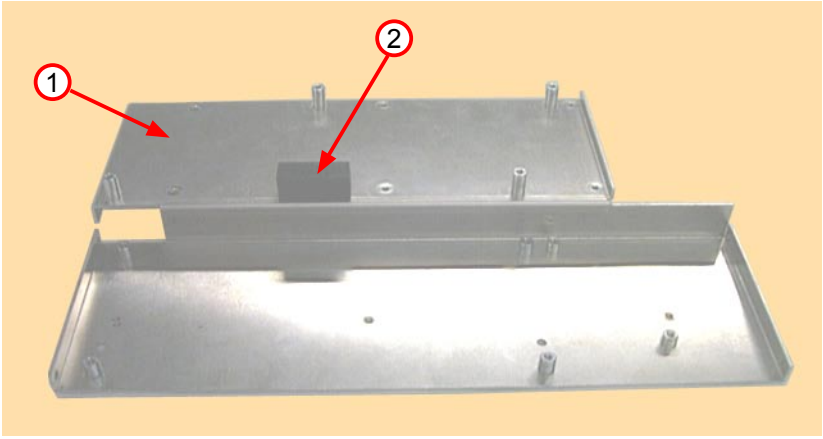
No.	Part No.	Description	QTY	Remarks
1	601310000	Front Side Plate	1	
2	601310110	AMP Guide Plate	2	
3	601310010	Rear Side Plate	1	
4	514400004	FG Terminal	1	
5	502112009	Power Switch, AJ2701B	1	
6	770131101	Fan Assembly	2	D04R-24TM(EX)
7	770131102	AC Power Input Assembly	1	Inlet, IG-0642S
8	690130040	Cable, CA, WR300-04	1	

6.2.3 AMP Slot Chassis Parts



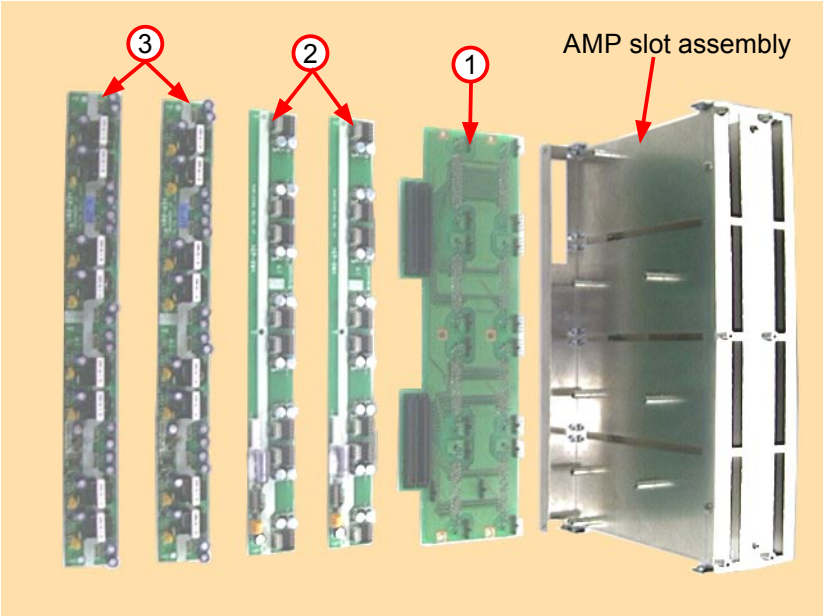
No.	Part No.	Description	QTY	Remarks
1	601310030	AMP Slot Chassis Top	1	
2	601310050	AMP Slot Chassis Bottom	1	
3	601310040	AMP Slot Chassis Center	1	

6.2.4 Power Supply Chassis Parts



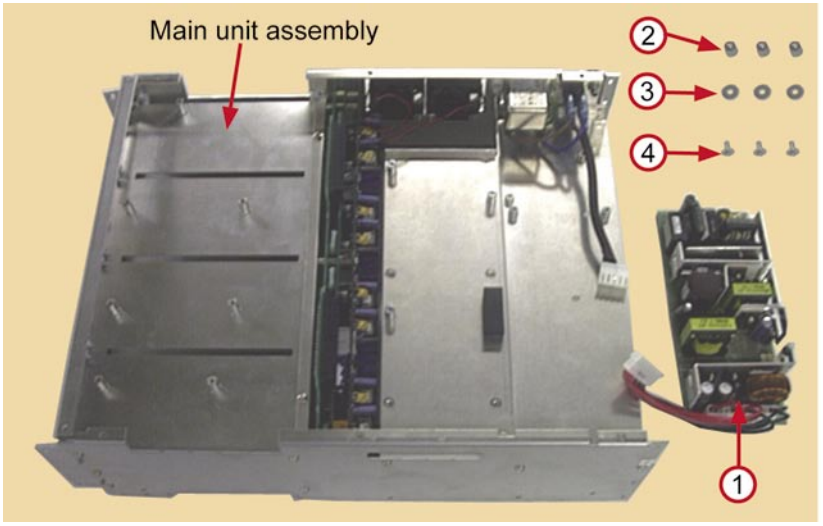
No.	Part No.	Description	QTY	Remarks
1	601310030	Power Supply Chassis	1	
2	601310050	16-Ch Control Board Holding Rubber	1	Only for 16-Ch model

6.2.5 AMP Mother Board Parts



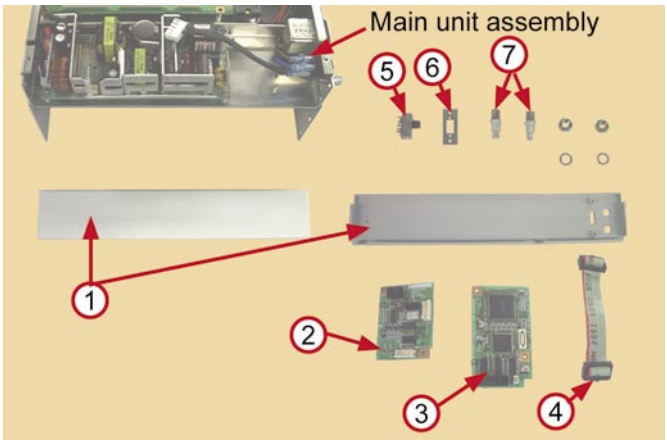
No.	Part No.	Description	QTY	Remarks
1	680130002	AMP Mother Board	1	WR300-02
2	770530103	AMP DC/DC 1 Board, PR, DM3000-13	1 or 2	4-ch, 8-ch: 1, 16-ch; 2
3	770530104	AMP DC/DC 2 Board, PR, DM3000-14	1 or 2	4-ch, 8-ch: 1, 16-ch; 2

6.2.6 Power Supply Parts



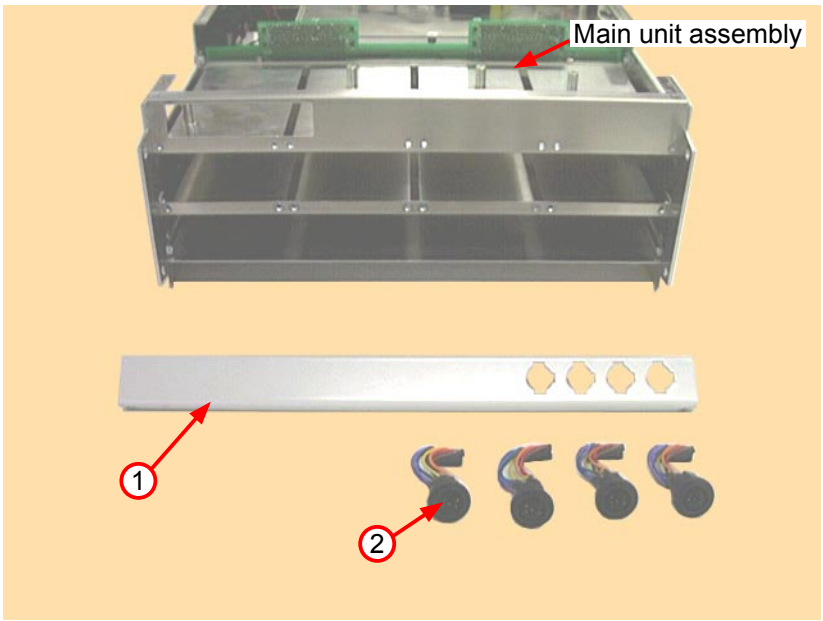
No.	Part No.	Description	QTY	Remarks
1	500052364	Power Supply Board, BFD24SX-U	1	100W for 4-ch model
	500052367	Power Supply Board, BFE24SX-U	1	150W for 8/16-ch model
2	380000108	Spacer, ASB-306	1 or 3	4-ch: 3, 8-ch/16-ch; 1
3		Washer, M3-C3	1 or 3	4-ch: 3, 8-ch/16-ch; 1
4		Flat head screw	1 or 3	4-ch: 3, 8-ch/16-ch; 1

6.2.7 Left Side Parts



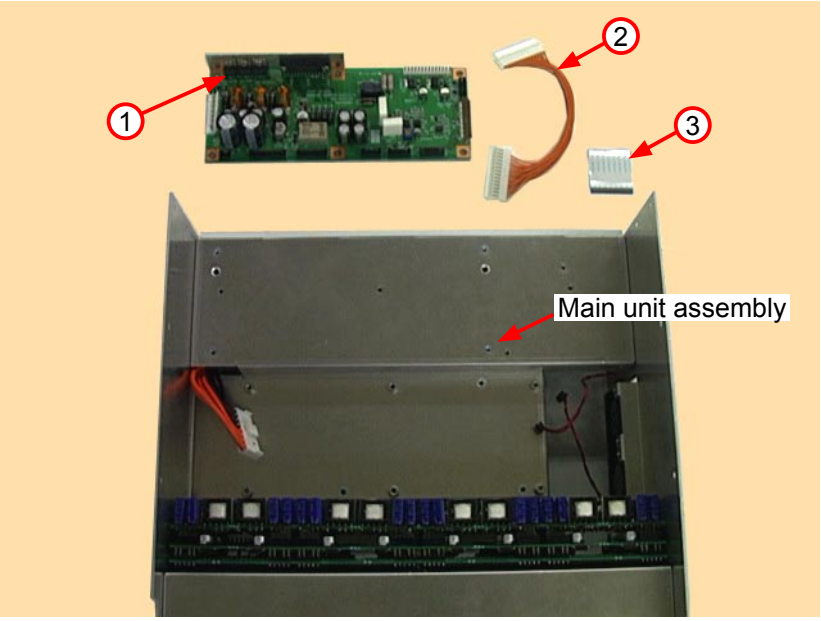
No.	Part No.	Description	QTY	Remarks
1	601310130	Left Side Cover	1	WR300
	601310140	IRIG Left Side Cover	1	WR310
2	770131126	IRIG Board 2, PR, WR300-09	1	WR310
3	770131124	IRIG Board 1, PR, WR300-08	1	WR310
4	690130520	Flexible Cable, FC, WR300-02	1	WR310
5	500052374	IRIG Switch, SSSB022200	1	WR310
6	601310150	IRIG Switch Bracket	1	WR310
7	500051391	IRIG Input Terminal Assembly	2	WR310

6.2.8 Logic Input Parts



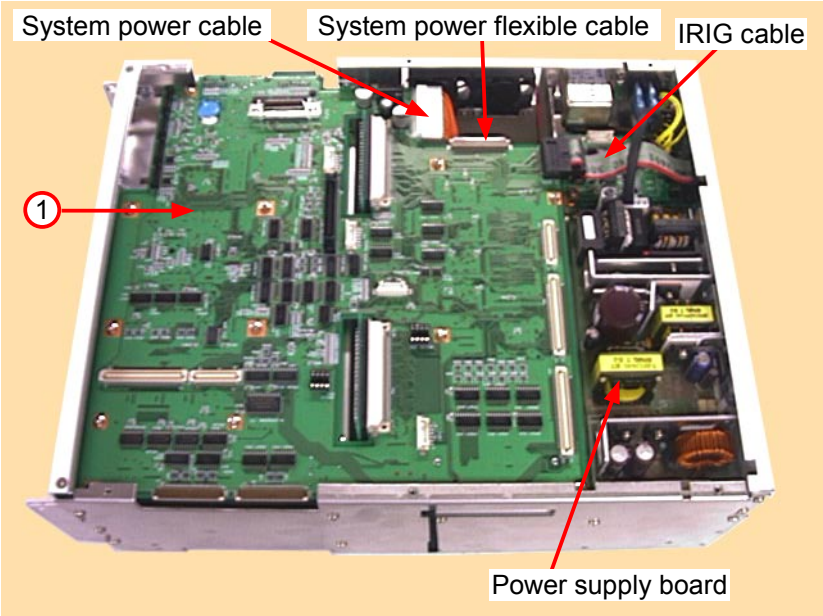
No.	Part No.	Description	QTY	Remarks
1	601310180	16-ch Logic Input Cover	1	
	601310170	8-ch Logic Input Cover	1	
	601310160	4-ch Logic Input Cover	1	
2	770131104	Logic Input Terminal Assembly	1/2/4	4-ch: 1, 8-ch: 2, 16-ch; 4

6.2.10 System Power Board Parts



No.	Part No.	Description	QTY	Remarks
1	770131131	System Power Board	1	
2	690130060	Cable, CA, WR300-06	1	
3	690130510	Flexible Cable, FC, WR300-01	1	

6.2.11 Main Control Board Parts

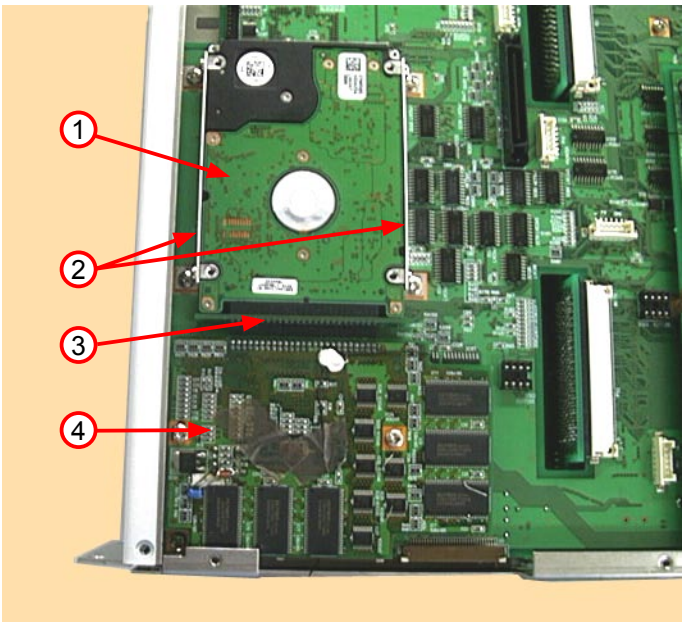


No.	Part No.	Description	QTY	Remarks
1	790131700	Main Control Board	1	

PCMCIA Card Slot Mechanical Part

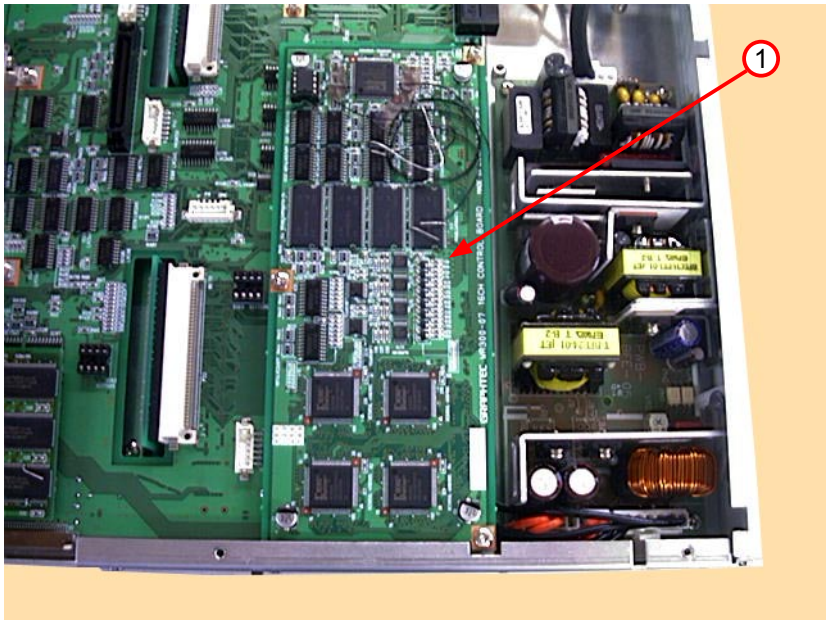
No.	Part No.	Description	QTY	Remarks
1	500052369	IC11SA-BD-PEJR	1	

6.2.11 HDD Parts



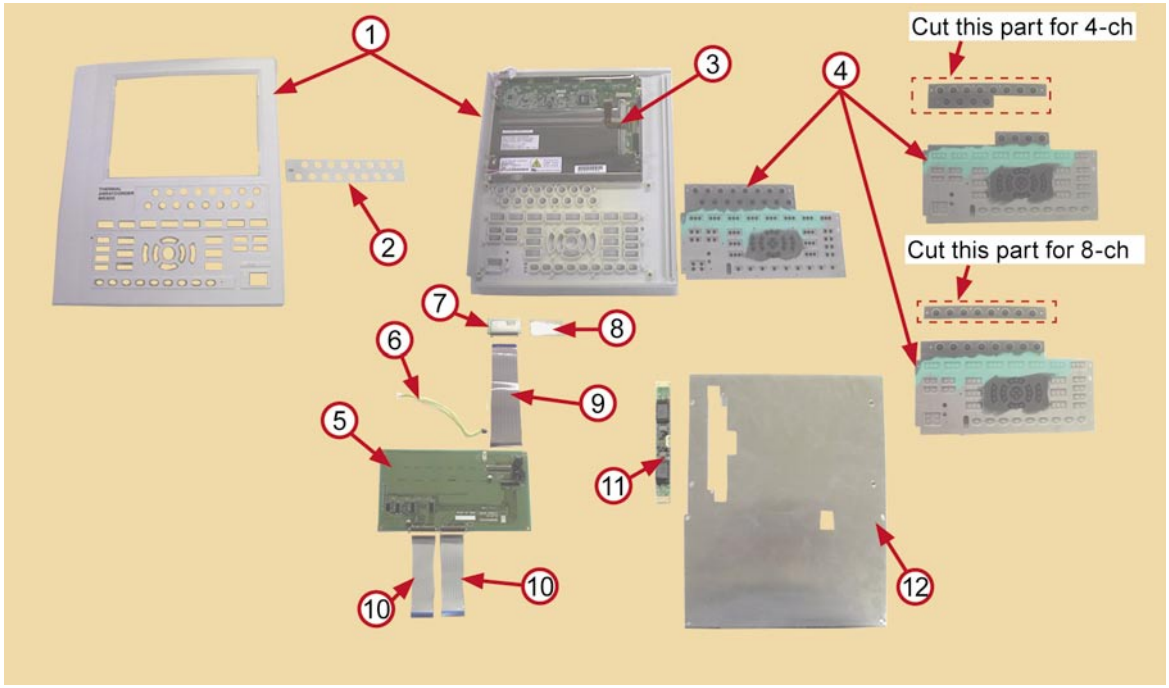
No.	Part No.	Description	QTY	Remarks
1	500051647	IC25N040ATMR04-0	1	HDD
2	607308300	HDD Bracket	2	
3	790530707	HDD Relay Board	1	DM3000-22A ASSY
4	790530706	HDD Control Board	1	DM3000-08A ASSY

6.2.12 16-ch Control Board Parts



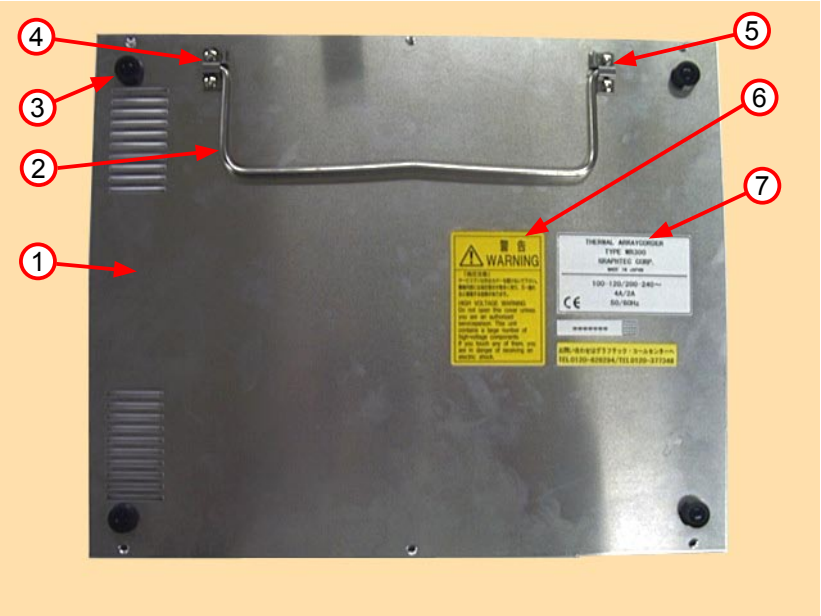
No.	Part No.	Description	QTY	Remarks
1		16CH Control Board	1	For 16CH unit

6.2.13 Control Panel Parts



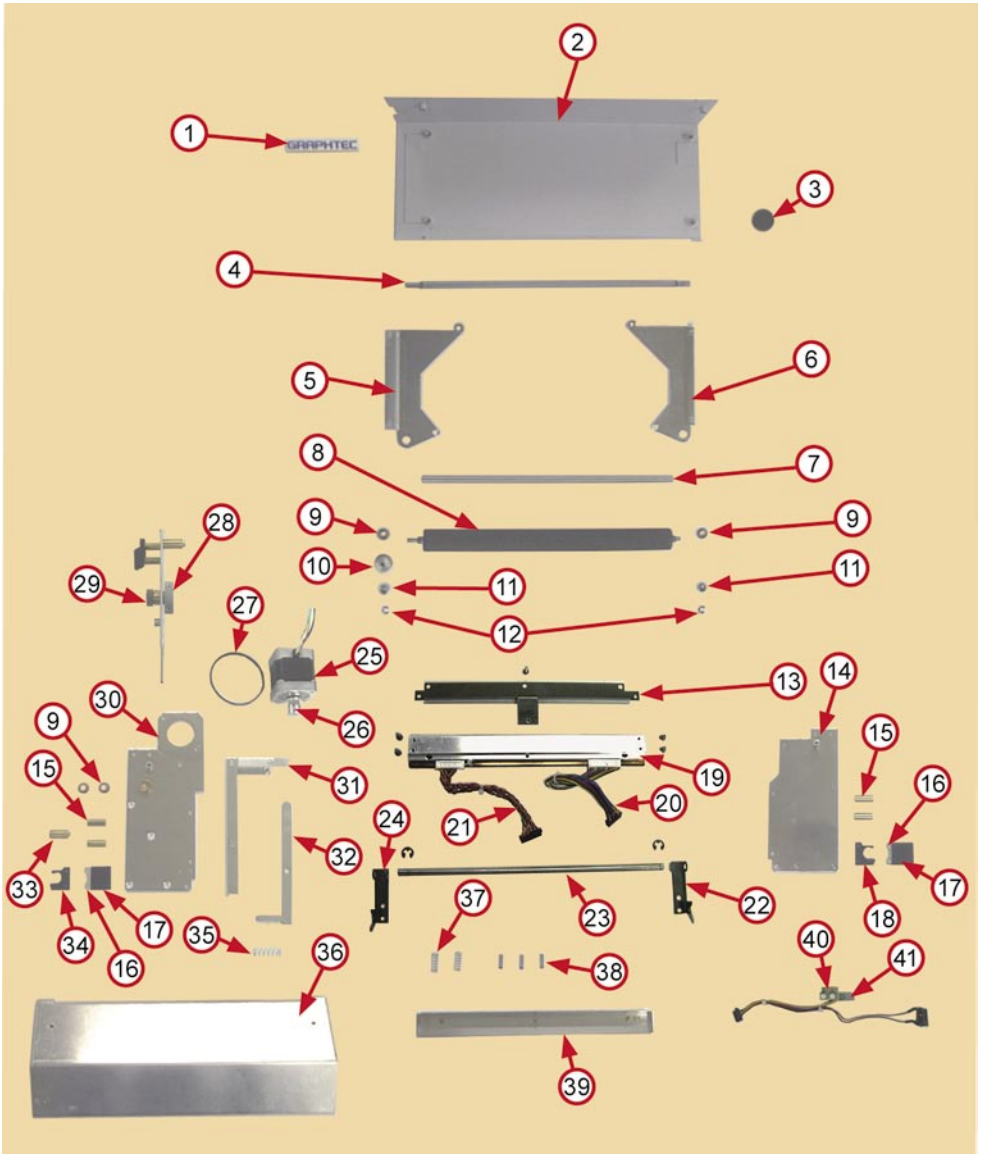
No.	Part No.	Description	QTY	Remarks
1	601310300	Control Panel Cover	1	
2	601310353	4-ch label	1	
	601310363	8-ch label	1	
	601310373	16-ch label	1	
3	500051411	LCD, AA084VC01	1	
4	601310310	Key Top	1	
5	790131701	Control Panel Board	1	
6	690130130	Cable, CA, WR300-13	1	
7	770131118	LCD Relay Board, PR, WR300-05	1	
8	601310340	LCD Relay Board Insulation Sheet	1	
9	690130540	Flexible Cable, FC, WR300-04	1	
10	690130530	Flexible Cable, FC, WR300-03	2	
11	500051412	DC-AC Inverter, S-12613-7M	1	
12	601310330	Control Panel Chassis	1	
13	601310230	4-ch AMP Label	1	
	601310240	8-ch AMP Label	1	
	601310250	16-ch AMP Label	1	

6.2.14 Bottom Cover Parts



No.	Part No.	Description	QTY	Remarks
1	601310120	Bottom Cover	1	
2	301120000	Tilt Stand, TM-74-3	1	
3	309100132	Foot, CP-30-FF-6	4	
4	601100310	Tilt Stand Holder, Right	1	
5	601100320	Tilt Stand Holder, Left	1	
6	601900150	Warning Label	1	

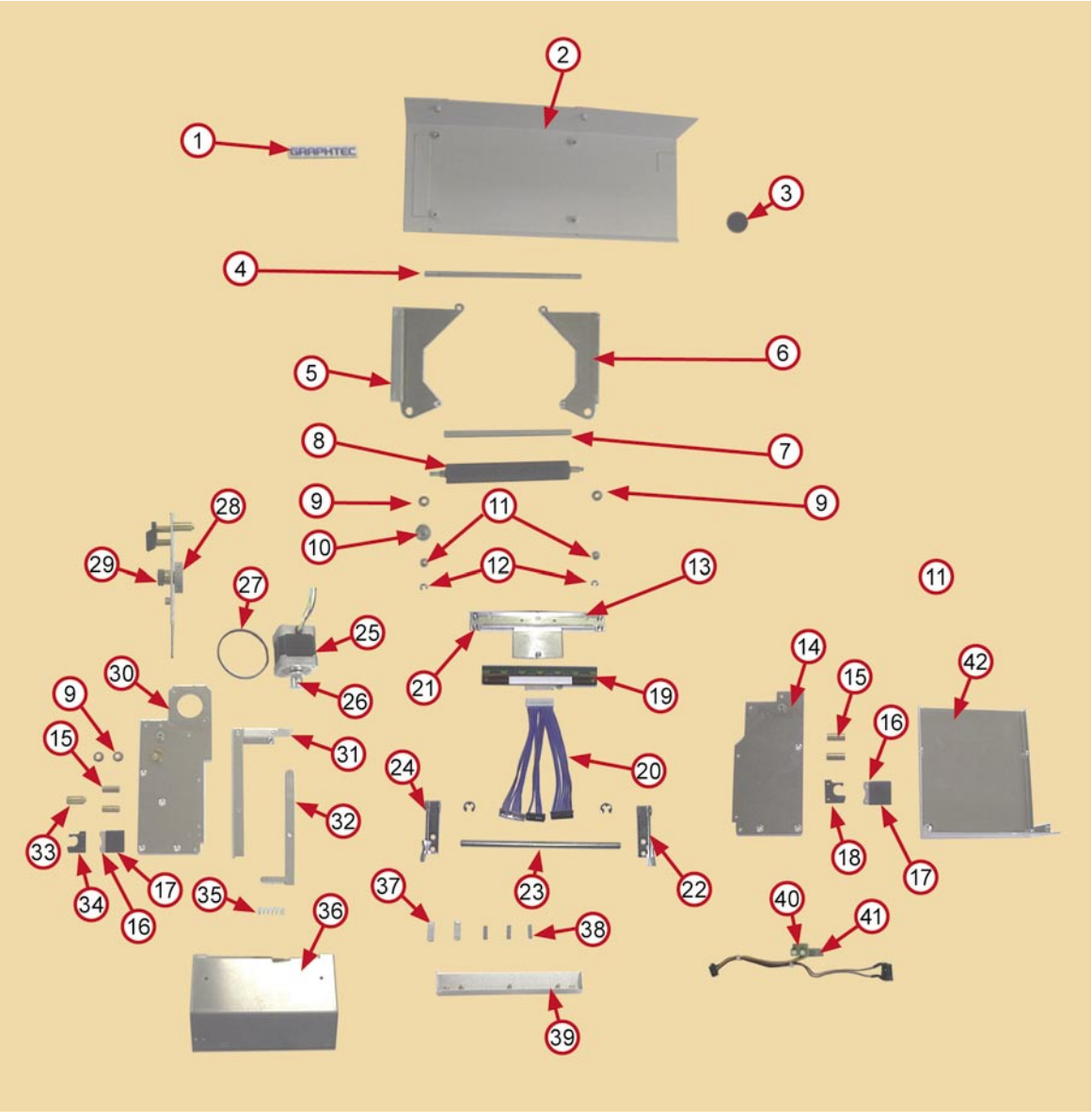
6.2.15 200-mm Width Printer Parts



No.	Part No.	Description	QTY	Remarks
1	601312310	Emblem Plate "GRAPHTEC", EFBL-60	1	
2	601312140	Printer Cover 200	1	
3	601312300	Printer Cover Knob	1	
4	601312150	Printer Cover Shaft 200	1	
5	601312250	Printer Cover Right Side Plate	1	
6	601312240	Printer Cover Left Side Plate	1	
7	601902110	Stocker Guide Shaft	1	
8	601902030	Writing Drum	1	
9	320806010	Bush, BBB F6x8x3:10x1	2	
10	601902130	Gear, Writing Drum	1	
11	310008420	Bearing, MR84ZZMC3PS2S	2	
12		E-ring	2	
13	601902210	Thermal Head Position Adjusting Plate	1	
14	601312100	Right Side Plate 200	1	
15	601312200	Bobbin Holder Shaft	4	
16	601902200	Tension Plate	1	
17	076000620	Tension Felt	1	
18	075002210	Bobbin Holder, Right	1	
19	500002329	Thermal Head, KJT-216-8MGF1-GR	1	
20	690130080	Cable, CA, WR300-08	1	

No.	Part No.	Description	QTY	Remarks
21	690130090	Cable, CA, WR300-09	1	
22	601312230	Thermal Head Lift Arm, Left	1	
23	601312110	Thermal Head Lift Shaft	1	
24	601312220	Thermal Head Lift Arm, Right	1	
25	500002501	Motor, PK245-01A-C58	1	
26	077002020	Gear, Motor	1	
27	378209011	Belt, 90MXL4.8	1	
28	601902150	Pulley	1	
29	601902140	Gear, Pulley	1	
30	601312210	Left Side Plate	1	
31	601312270	Printer Top Blind Plate	1	
32	601312430	Arm	1	
33	601312440	Arm Shaft	1	
34	075002200	Bobbin Holder, Left	1	
35	380101441	Spring, C-144	1	
36	601312180	Printer Chassis 200	1	
37	380101661	Spring, C-166	1	
38	380105151	Spring, DC-515	3	
39	601312130	Head Pressure Plate 200	1	
40	770131118	Printer Sensor Board	1	
41	601100750	Sensor Bracket	1	

6.2.16 100-mm Width Printer Parts



No.	Part No.	Description	QTY	Remarks
1	601312310	Emblem Plate "GRAPHTEC", EFBL-60	1	
2	601312040	Printer Cover 100	1	
3	601312300	Printer Cover Knob	1	
4	601312050	Printer Cover Shaft 100	1	
5	601312250	Printer Cover Right Side Plate	1	
6	601312240	Printer Cover Left Side Plate	1	
7	601902060	Stocker Guide Shaft 100	1	
8	601902070	Writing Drum 100	1	
9	320806010	Bush, BBB F6x8x3:10x1	2	
10	601902130	Gear, Writing Drum	1	
11	310008420	Bearing, MR84ZZMC3PS2S	2	
12		E-ring	2	
13	601312020	Thermal Head Position Adjusting Plate 100	1	
14	601312100	Right Side Plate 200	1	
15	601312200	Bobbin Holder Shaft	4	
16	601902200	Tension Plate	1	
17	076000620	Tension Felt	1	
18	075002210	Bobbin Holder, Right	1	
19	500002329	Thermal Head, KJT-216-8MGF1-GR	1	

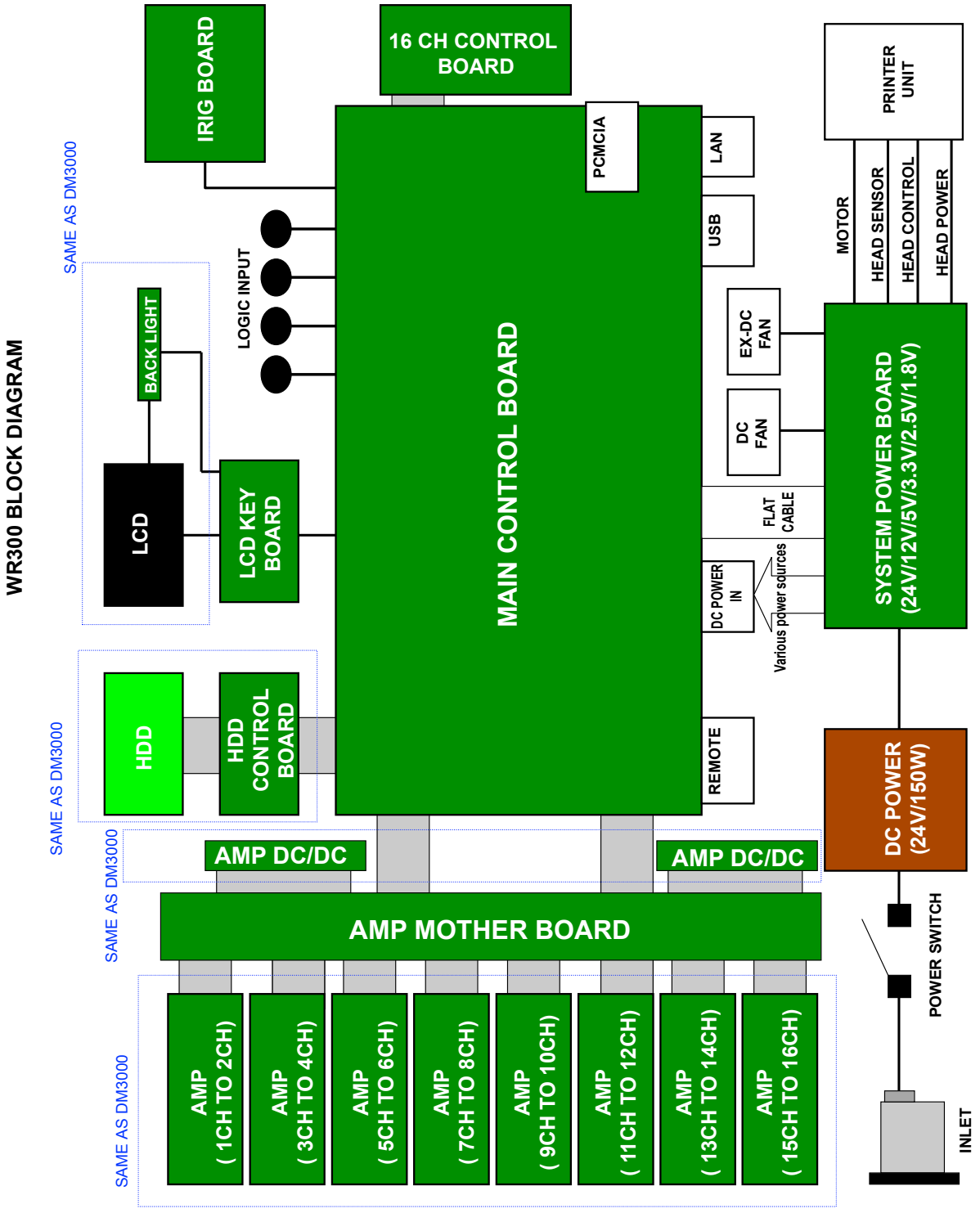
No.	Part No.	Description	QTY	Remarks
20	690130110	Cable, CA, WR300-11	1	
21	601312090	Head Support Shaft 100	4	
22	601312230	Thermal Head Lift Arm, Left	1	
23	601312010	Thermal Head Lift Shaft 100	1	
24	601312220	Thermal Head Lift Arm, Right	1	
25	500002501	Motor, PK245-01A-C58	1	
26	077002020	Gear, Motor	1	
27	378209011	Belt, 90MXL4.8	1	
28	601902150	Pulley	1	
29	601902140	Gear, Pulley	1	
30	601312210	Left Side Plate	1	
31	601312270	Printer Top Blind Plate	1	
32	601312430	Arm	1	
33	601312440	Arm Shaft	1	
34	075002200	Bobbin Holder, Left	1	
35	380101441	Spring, C-144	1	
36	601312180	Printer Chassis 200	1	
37	380101661	Spring, C-166	1	
38	380105151	Spring, DC-515	3	
39	601312130	Head Pressure Plate 200	1	
40	770131118	Printer Sensor Board	1	
41	601100750	Sensor Bracket	1	
42	601312260	Printer Bottom Blind Plate	1	

6.2.17 Other Parts

No.	Part No.	Description	QTY	Remarks
1	601319100	CD-ROM User's Guide WR300-CUG01	1	
2	601319000	Packing Box	1	
3	913023050	Recording Paper, PR-230	1	4-ch Model
	913023152	Recording Paper, PR-231A	1	8/16-ch Models
4	601909000	Flange Bobbin	2	
5	513400052	Connector, FCN360C016-B-GG	1	
6	601310320	LCD Protective Plate	1	

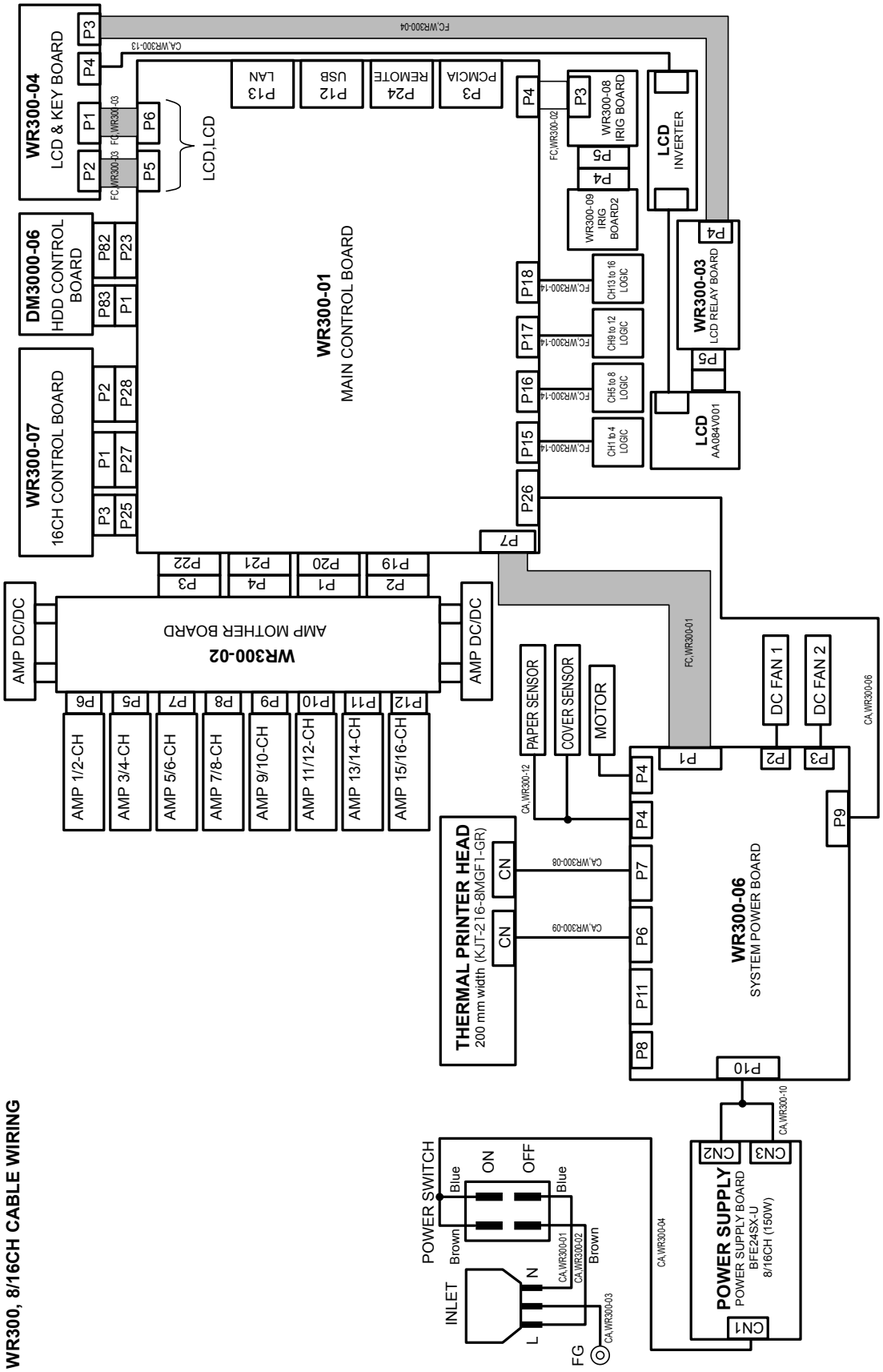
7. BLOCK DIAGRAM

7.1 BLOCK DIAGRAM



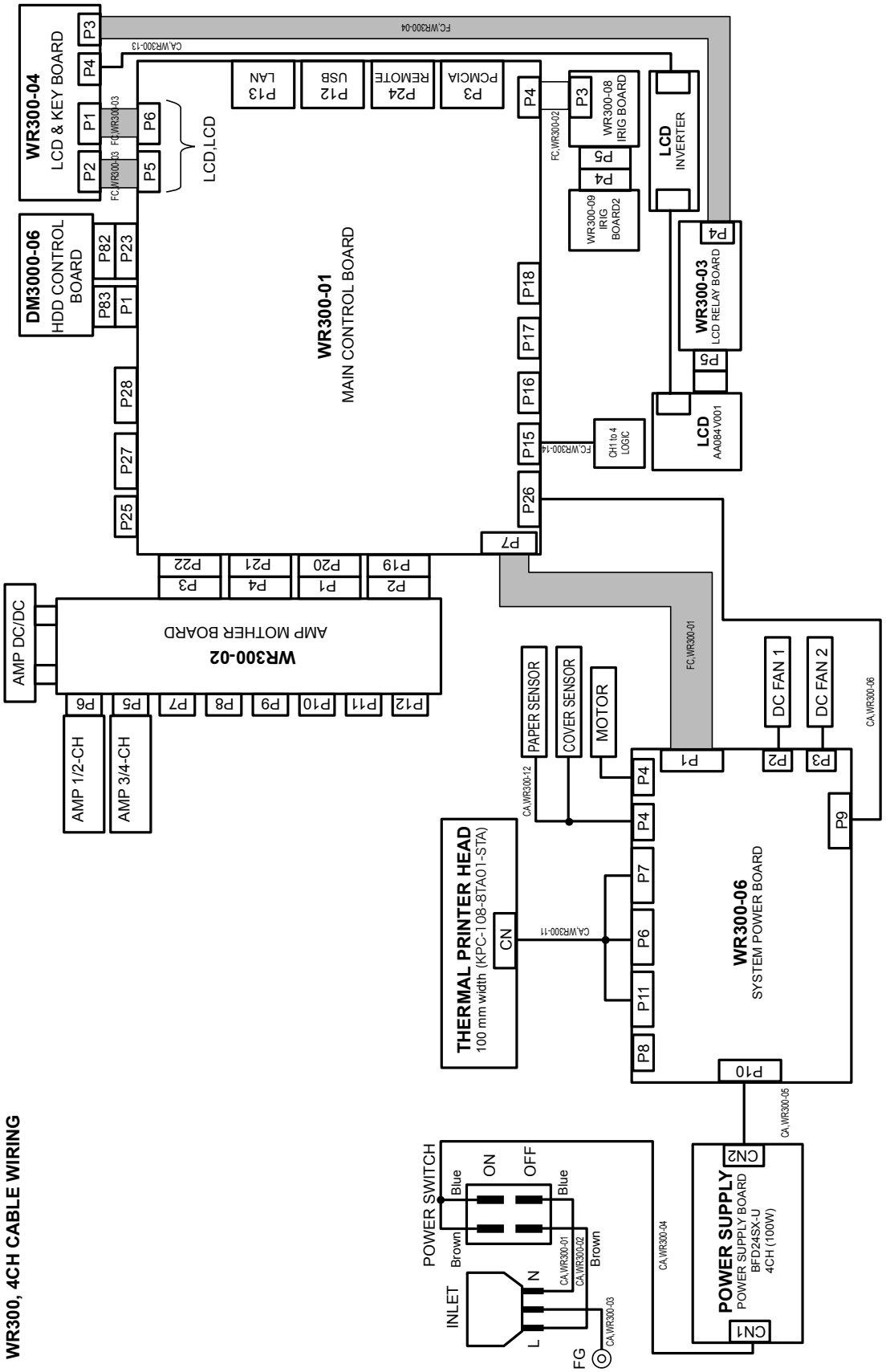
7.2 CABLE WIRING

7.2.1 Cable Wiring for 8/16-ch Models



WR300, 8/16CH CABLE WIRING

7.2.2 Cable Wiring for 4-ch Model



WR300, 4CH CABLE WIRING